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University of Michigan Studies

*HUMANISTIC SERIES*

VOLUME XLI

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ROMAN GLASS FROM KARANIS

FOUND BY THE

UNIVERSITY OF MICHIGAN

ARCHAEOLOGICAL EXPEDITION IN EGYPT

1924-29



722

CLASS XI. JUG

See p. 243. Scale  $\frac{1}{4}$

# ROMAN GLASS FROM KARANIS

FOUND BY THE  
UNIVERSITY OF MICHIGAN  
ARCHAEOLOGICAL EXPEDITION  
IN EGYPT, 1924-29

BY  
DONALD B. HARDEN

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## P R E F A C E

MY encouragement to begin the course of studies of which this book is the long-delayed outcome came from two sources. To the late Mrs. Stephen V. Harkness, foundress of the Commonwealth Fund, I owe, albeit indirectly, all those facilities for the study of the subject in America which fell to my lot as the holder of a Commonwealth Fund Fellowship at the University of Michigan from September 1926 to June 1928. To the late Francis Willey Kelsey, Professor of Latin at the University of Michigan until his death in 1927, I owe not only the initial suggestion of the subject, but also constant help and advice both before and during my first year's work at Ann Arbor. It is only fitting that the names of these two should be coupled thus together in the forefront of these pages.

To the University of Michigan and the members of its Near East Research Committee I tender thanks, not only for the care and patience with which they have from time to time answered letters and inquiries in regard to subject-matter and procedure, but also for their generosity in providing supplementary grants for travel and for illustrations, which have, I hope, enabled this work to be less inadequate in scope than it might otherwise have been.

The inevitable difficulties which were bound to ensue from the publication at one and the same time of material housed in America and Egypt by an author working in England have been rendered infinitely less by the kind offices of Dr. Orma F. Butler, Curator of the Museum of Classical Archaeology in Ann Arbor, and of Mr. Enoch E. Peterson, Field Director of the Expedition, and Mr. R. Engelbach of the Cairo Museum.

The drawings of those glasses which had already gone to Ann Arbor were made there by Miss D. L. Myers, working under the supervision of Dr. Butler; the drawings of glass now housed in the Cairo Museum were made by MM. Ivan Terentieff and Semeon Golovko of the field staff, and Miss A. M. Calverley of the Egypt Exploration Society; the drawings of the majority of the fragmentary pieces were made under my personal supervision in Oxford by Miss C. Mirèio Legge of the Manchester Museum. In addition to her original drawings Miss Legge has revised and inked in under my direction those drawings which came from Cairo and Ann Arbor, so that the whole of plates XI to XXII ultimately came from her pen. The care and accuracy with which she accomplished her laborious task need no words of mine to elaborate.

The majority of the photographs which comprise plates I to X were made by Mr. G. R. Swain of Ann Arbor; the remainder were made in Cairo or in Oxford. For the illustrations comprising figures 1 to 4 I am indebted to the kindness of the authorities of the Antiquarium, Egyptian Museum, and Kaiser Friedrich Museum, Berlin; the Brooklyn Museum; the Cairo Museum; the University Museum of Archaeology and of Ethnology, Cambridge; the Wallraf-Richartz Museum, Cologne; the British Museum and the Victoria and Albert Museum, London; the Manchester Museum; the Ashmolean Museum, Oxford; the Toledo Museum; and the Royal Ontario Museum, Toronto.

Those museum-directors and others who have helped me by correspondence and advice are too numerous to mention individually. I can but hope that they will accept this collective reference to their kindness and readiness to help, in the knowledge that I am not unmindful of their assistance.

For help and advice on technical matters and terminology I have to thank various glass-workers and others in Europe and America, but not least Mr. W. A. Thorpe of the Victoria and Albert Museum, who has discussed such matters with me at great length, and whose suggestions have in many instances been incorporated in pages 11 to 20. Professor W. E. S. Turner of Sheffield very kindly had qualitative analyses of some specimens of dark blue glass made for me in his laboratory.

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And finally, how much help both of a technical and of a personal kind I owe to the Printer to the University of Oxford and to his staff at the University Press none but they and I can ever know. Suffice it to say that, without their assistance, I doubt if this book would ever have been born.

D. B. HARDEN.

OXFORD,  
*August, 1935.*

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- d.* Cologne, no. 26. 974; *e.* Cologne, no. 869; *f.* Berlin, Antiquarium, Inv. 30638;
- g.* Berlin, Egyptian Museum, Inv. 19347; *h.* Victoria and Albert Museum, no. 365. 1900; *j.* Berlin, Egyptian Museum, Inv. 19348.

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- a.* Cambridge, Ransom Coll., no. 23. 788 B; *b.* Victoria and Albert Museum, no. 690. 1905; *c.* Cologne, no. 208; *d.* Cairo, no. J 43344; *e.* British Museum, Sloane Coll., 1756; *f.* Cologne, no. 475; *g.* Toledo, no. 354. 9871; *h, j, k.* Brooklyn, Wilbour Coll., nos. 379, 383, 378.

## FIGURE 3.

*a.* British Museum, Turner bequest, 1896; *b.* Berlin, Antiquarium, Vom Rath Coll., no. 182; *c.* Cologne, no. 23. 123; *d.* Victoria and Albert Museum, no. C 98. 1929; *e.* British Museum, Durighello Coll., 1913; *f.* Toronto, no. G 1980; *g.* Michigan, no. 5120; *h.* Berlin, Egyptian Museum, Inv. 19360; *j.* Manchester, no. 2082; *k.* British Museum, Wallis Coll., 1891; *l.* Cairo, no. J 41061; *m.* Oxford, no. 1912. 69; *n.* Kaiser Friedrich Museum, no. 2393.

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*a.* Cairo, no. J 48218; *b.* Cairo, no. J 40444; *c.* British Museum, Cesnola Coll.; *d.* Cairo, no. J 45766; *e.* Cairo, no. J 45767; *f.* Cairo, no. J 46481; *g.* Cairo, no. J 45776; *h.* Cairo, no. J 46484; *j.* Cairo, no. J 46482; *k.* Cairo, no. J 45768; *l.* Victoria and Albert Museum, no. C 339. 1928; *m.* British Museum, Burgon Coll., no. 325; *n.* British Museum, Burgon Coll., no. 326; *o.* British Museum, British and Mediaeval Department, Roach Smith Coll., 1856.

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## PRINCIPAL MUSEUMS CITED IN THE TEXT

Avignon	Musée Calvet, Avignon, France.
Berlin,	Antiquarium der Staatlichen Museen, Berlin.
Antiquarium	
Berlin, Egyptian	Aegyptische Abteilung der Staatlichen Museen, Berlin.
Museum	
Bonn	Provinzialmuseum, Bonn, Germany.
Boston	Museum of Fine Arts, Boston, Mass.
British Museum <sup>1</sup>	British Museum, London, Department of Ceramics and Ethnography.
British Museum, British and Mediaeval Dept.	British Museum, London, Department of British and Mediaeval Antiquities.
British Museum, Egyptian Dept.	British Museum, London, Department of Egyptian and Assyrian Antiquities.
Brooklyn	Brooklyn Museum, Eastern Parkway, Brooklyn, N.Y.
Brussels	Musées royaux du cinquantenaire, Brussels.
Cairo	Musée Égyptien, Cairo.
Cambridge	University Museum of Archaeology and of Ethnology, Cambridge, England.
Cologne	Wallraf-Richartz-Museum der Stadt Köln, Köln, Germany.
Edinburgh	Royal Scottish Museum, Edinburgh.
Kaiser Friedrich Museum	Kaiser Friedrich Museum, Staatliche Museen, Berlin.
London Museum	The London Museum, Lancaster House, St. James's, London.
Louvre	Musée National du Louvre, Paris.
Lyons	Musées de la Ville de Lyon, Lyon, France.
Manchester	The Manchester Museum, The University, Manchester, England.
Marseilles	Musée Borély, Marseille, France.
Mayence	Römisch-germanische Zentral-Museum, Mainz, Germany.
Metropolitan Museum	Metropolitan Museum of Art, New York.
Musée Guimet	Musée Guimet, Paris.
Nîmes	Musée Archéologique, Nîmes, France.
Nîmes, Maison Carrée	Musée de la Maison Carrée, Nîmes, France.
Oxford	Ashmolean Museum, Oxford, England.
Philadelphia	University Museum, University of Pennsylvania, Philadelphia, Pa.
Reading	Public Museum and Art Gallery, Reading, England.
St. Germain	Musée des Antiquités Nationales au Château de St. Germain-en-Laye, France.
Toledo	Toledo Museum of Art, Toledo, Ohio.

<sup>1</sup> The bulk of the Roman glass in the British Museum is housed in this department. The name of the department has therefore been omitted in references, for the sake of brevity.

Toronto	Royal Ontario Museum of Archaeology, Toronto, Canada.
Trèves	Provinzialmuseum, Trier, Germany.
Victoria and Albert Museum	Victoria and Albert Museum, South Kensington, London.
Wiesbaden	Landesmuseum Nassauischer Altertümer, Wiesbaden, Germany.

## GLOSSARY OF GENERAL GLASS-WORKING TERMS

<i>Blow-pipe</i>	Hollow metal pipe for blowing glass.
<i>Pontil</i>	Solid metal rod for holding vessel during manufacture.
<i>Marver</i>	Flat surface for rolling vessel on during manufacture.
<i>Pucellas</i>	Tongs for fashioning vessel.
<i>Reamer</i>	Tool with flat blade ending in a point, for fashioning vessel.
<i>Batch</i>	Mixture of raw materials.
<i>Fritting</i>	The act of fusing the batch.
<i>Frit</i>	The result of fusing the batch.
<i>Founding</i>	The act of re-fusing the frit after impurities have been removed.
<i>Metal</i>	The resultant substance (glass), both in its unworked state and after being worked up into objects.
<i>Pot</i>	A crucible full of metal.
<i>Annealing</i>	The process of cooling the metal after it has been worked.
<i>Paraison</i>	Blob of glass from the pot, for working.

## GENERAL INTRODUCTION

THE present volume, which forms one of a series dealing in detail with the finds of the University of Michigan Near East Research Expedition at Karanis (Kôm Aushîm) in the Fayûm, is a Catalogue of the glassware found during the first five seasons of excavation, 1924-5 to 1928-9. No attempt has been made to incorporate any glass found in subsequent seasons, and the author has not even examined such glass. So much material, both complete and fragmentary, was available from the first five years (there are upwards of 150 complete pieces, besides numerous broken vases whose shapes were restorable, and thousands of small fragments) that it was felt that a detailed catalogue might be attempted with the reasonable hope that any classification adopted would prove of permanent value for the arrangement of future finds at Karanis, and also of glassware discovered on other Egyptian sites. It may be that the more recent material will call for certain minor readjustments in the system of classification; it is unlikely that serious rearrangement will be necessitated.

Karanis was known to be prolific in glassware before the Michigan excavations began. Several large hoards of glass and some smaller groups and single pieces, which had been found there during *sebbakh*-digging, were preserved in Cairo, and, besides, there was a strong presumption that most if not all of the Roman portion of the Askren collection, purchased by the University of Michigan in 1924, actually came from Karanis.<sup>1</sup> An account of these previous finds will be found in the Appendix at the end of the Catalogue. They have often proved useful in supplementing the 1924-9 material both for the restoration of fragmentary examples and as evidence of variant types. No doubt much of the glass labelled 'Fayûm' in museums and collections also comes from the site, but in default of more definite information it has been omitted from the list in the Appendix.

### FIELD INVENTORY NUMBERS; ACCOUNT OF AREAS EXCAVATED

The preliminary topographical and architectural report of the excavations of 1924-8, published in 1931,<sup>2</sup> renders superfluous any

<sup>1</sup> P. 307 below.

<sup>2</sup> A. E. R. Boak and E. E. Peterson, *Karanis, Topographical and Architectural Report of Excavations during the Seasons 1924-28*, Ann Arbor, University of Michigan Press, 1931 (University of Michigan Studies, Humanistic Series, vol. xxv).

detailed remarks on the scope and extent of the work on the Kôm, for it gives a description of the areas and levels excavated during all five years, and of the principal houses and buildings discovered during the last three. The series of detailed plans of areas B, C, and G given at the end of that book must be referred to if it is desired to inquire into the find-spot of any glass from those areas listed in this Catalogue. The publication of the 1924-6 plans, and the publication of other finds, ostraca, papyri, coins, pottery, and the rest, will follow in due course.

It may be convenient, however, to recapitulate the system of numbering adopted in the field inventory, and to indicate briefly, with reference to the general plan of the areas of excavation in the topographical report,<sup>1</sup> where each group of houses was situated on the Kôm.

By 1924<sup>2</sup> the Kôm had been denuded in the centre by the depredations of *sebbakhîn*, and divided into two portions, with a narrow bridge joining them on the northern edge. The whole of the southern and central portions of the town had disappeared, and only the western, northern, and eastern fringes remained intact.

During the first season, 1924-5, excavation took place in four areas, A, B, E, and F. In areas A and E, on the western side of the Kôm, units belonging to the top level were numbered 4000 and upward, and units belonging to the second level 5000 and upward. In area B, on the eastern side, units belonging to the top level were numbered 100 and upward, and units belonging to the second level 5000 and upward. A group of granaries toward the south of this area received letters from A to AY, but no numbers. Area F, in the centre of the Kôm, comprised Ptolemaic foundations only, and no glass was found there. In this same year groups of objects found below the surface but unconnected with any unit of occupation were numbered from 1 to 99.

During the second season, 1925-6,<sup>3</sup> excavation took place principally in areas C and D, on the east and north of the Kôm respectively, with a little in areas A, B, and E. In areas A and E the numbering system continued as in 1924-5, and in areas B, C, and D units were numbered as for area B in 1924-5.

During the third season, 1926-7,<sup>4</sup> excavation took place solely in a new area, G, to the south and west of area E. From now on a new

<sup>1</sup> Boak and Peterson, *op. cit.*, Plan I.

<sup>2</sup> *Ibid.*, pp. 1-4.

<sup>3</sup> *Ibid.*, p. 4.

<sup>4</sup> *Ibid.*, pp. 7 ff.

system of numbering was adopted and the successive levels from the top downward were labelled 'A period,' 'B period,' 'C period,' and so on.<sup>1</sup> In area G in 1926-7 only a few stray remains of A period were found, the majority of the finds belonging to a lower or B period of occupation. With the new system of numbering a distinction between houses, streets, and open areas was initiated. Houses were given plain letters (e.g., B 1), streets had their letter followed by S (e.g., BS 1), and areas their letter followed by A (e.g., BA 1). Further, if a unit existed unchanged throughout two occupation levels, it received both the appropriate letters (e.g., BC 38).

For the fourth and fifth seasons, 1927-8 and 1928-9,<sup>2</sup> a return was made to the eastern side of the Kôm, and a systematic clearance of the rest of areas B and C was begun. During these two years a combination of the two systems of numbering was necessary. Units which had already received 100 or 5000 numbers were allowed to retain them, but new units, and earlier periods of occupation in the old units, were numbered according to the new system. In 1928-9 it was found advisable to make a slight innovation and to denote by a star stray objects from unoccupied strata between occupation levels.

In all years stray surface finds were labelled 'x,' and finds handed over by the summer guards were labelled 'sg.' Sub-units (e.g., rooms or courtyards within houses) were denoted by letters following the unit number, and individual finds by letters separated from the unit and sub-unit number by an oblique stroke.

The following examples will illustrate the system of notation:

1924/X	= a surface find in 1924-5.
1924/A/G	= find G in granary A, east side of Kôm, 1924-5.
1924/20/C	= find C in group 20 from below surface but unconnected with an occupation unit, 1924-5.
1924/100/O	= find O in unit 100, east side of Kôm, top layer, 1924-5.
1924/4006/C	= find C in unit 4006, west side of Kôm, top layer, 1924-5.
1924/5000/H	= find H in unit 5000, east or west side of Kôm, second layer, 1924-5.
1926/A 3/G	= find G in house 3 of A period, west side of Kôm, 1926-7.
1926/B 1 B/H	= find H in room B of house 1 of B period, west side of Kôm, 1926-7.
1926/BC 38 A/C	= find C in room A of house 38, B and C periods, west side of Kôm, 1926-7.

<sup>1</sup> It should be clearly recognized that A-period houses need not necessarily be of the same date in different parts of the Kôm, and this applies also to the B- and C-period houses. It will be pointed out below (p. 31) that some of the B-period houses of 1926 are undoubtedly earlier than even the C-period of 1927 and 1928.

<sup>2</sup> *Ibid.*, pp. 39 ff.

1926/BS 1/J = find J in street 1, B period, west side of Kôm, 1926-7.  
 1927/SG/C = find C, summer guards, 1927.  
 1927/CA 19/z = find z in area 19, C period, east side of Kôm, 1927-8.  
 1928/130\*/C = find C in unoccupied area below house 130, top layer, east side of Kôm, 1928-9.

#### CATALOGUE AND MUSEUM NUMBERS

In cataloguing, each piece has been given a separate index number. The numbers following the index number are, first, the field-inventory numbers, as above, and second, if the piece has already been received in either Cairo or Ann Arbor, the museum number. The words 'Not retained' following the field-inventory number mean that an object was discarded after entry in the field inventory. The word 'Donor' in the same position signifies that the piece has been presented by the University of Michigan to the anonymous patron of the excavations. Where nothing follows the field-inventory number, the piece is still in camp, and has not yet come up for division. Indexes to the Cairo and Ann Arbor museum numbers will be found at the end of the volume.

#### ILLUSTRATIONS

With one or two exceptions, every main type that is represented by a complete or nearly complete vase has been illustrated in collotype, and all vases so illustrated are also figured in section and elevation on the appropriate plate of line drawings. In addition, almost all the fragments that show variations of importance have been drawn and figured. Illustrative material from previous finds at Karanis, from other sites in Egypt, and from other provinces, will be found on the half-tone plates. In giving references, the collotypes and the line drawings are numbered consecutively as one group with Roman numerals, and are referred to as 'Plates'; the half-tone plates are numbered with Arabic numerals, and are referred to as 'Figures.'

#### CLASSIFICATION

The classification adopted in the Catalogue is purely morphological. The glass is divided into fourteen classes, as follows:

- I. Dishes and plates
- II. Shallow bowls

- III. Deep bowls
- IV. Bowls on stem
- V. Beakers and goblets
- VI. Conical lamps
- VII. Drinking cups and goblets on stem
- VIII. Jars
- IX. Flasks
- X. Bottle-flasks without handles
- XI. One-handled jugs and bottles
- XII. Two-handled flasks and bottles
- XIII. Toilet-bottles
- XIV. Miscellaneous objects, inlay, and doubtful fragments

These classes are subdivided on the basis of minor differences of shape, technique, and decoration. Colour<sup>1</sup> is only used as a basis of classification in default of any more trustworthy criterion, because it does not appear that the Roman glass-worker paid much attention to the various shades of colour he might produce. No attempt has been made to arrange the vases in any special order of date or of fabric, though more often than not vases of similar date and fabric do fall into the same group when classified on the present lines.

A uniform order has been adopted in the description of individual specimens. First, the colour, preservation, and material<sup>2</sup> of the object are given; next, on a separate line, the dimensions; then follows the general description of shape, technique, and decoration; and finally an indication is given of the fabric to which the vase belongs.

With regard to dimensions, as every important variant has been drawn to scale, the Catalogue has not been overloaded with elaborate lists. Only the height (H.), the diameter (D.) or greatest width (G.W.), and the average thickness (A.T.) are given, unless the vase shows peculiarity or inconsistency in some of its other dimensions sufficient to warrant their inclusion. Very few of the vases are completely symmetrical. Variations from symmetry are only noted in extreme cases. The measurement of the average thickness of the glass is at best approximate, and often, especially on narrow-mouthed vessels, only the thickness near the rim could be measured.

<sup>1</sup> See, further, *s.v.* 'Colour,' pp. 6-7.

<sup>2</sup> For a fuller treatment of these three characteristics see pp. 6-13.

## CHAPTER INTRODUCTIONS

The introductions printed at the head of each class or chapter contain not only such explanatory matter as seemed necessary for a proper understanding of the system of classification, but also indications of the probable date of the various types,<sup>1</sup> and a descriptive account of parallel examples from Egypt and from other provinces. These accounts, especially those of the Egyptian and Nubian material,<sup>2</sup> have been made as complete as possible, for it seemed that only thus could full emphasis be placed on the comparative value of the Karanis material for the elucidation of the history of Roman glassware.

In Chapter XIV, because of the nature of the material, it was impracticable to deal with the whole in a general introduction. Instead, each group of objects is prefaced by a small paragraph.

TECHNICAL MATTERS AND TERMINOLOGY<sup>3</sup>

## A. COLOUR

The modern glass-worker, by reason of improved methods and an accurate use of formulae, has a high degree of control over the colour of the glass he produces. The Roman worker was in a far less fortunate position. That his chemical knowledge was not negligible is proved by his use of certain colouring agents (chiefly copper, iron, and manganese) to produce glass of various colours.<sup>4</sup> But his methods were largely empirical, and his technical apparatus could not be called accurate, judging by modern standards. Nor was his chemical knowledge always equal to the task of removing the impurities in the available raw materials. Rarely, if ever, can he have known until the metal was fritted what exact shade of colour his batch would produce. That it would be green and not yellow he may have known; that it would be dark and not light green he probably never knew.

<sup>1</sup> See, further, *s.v.* 'Dating,' pp. 24-34.

<sup>2</sup> It cannot be claimed that the lists of unpublished material are exhaustive, or even adequate to the mass of it existing in museums all over the world, yet it is hoped that very little, if any, published material has escaped notice.

<sup>3</sup> A few of the most general technical terms used by glass-workers are not defined in the following pages, as they have been explained already in the short glossary on p. xiv.

<sup>4</sup> See Lucas, *Materials*, pp. 49 ff. The account there refers principally to dynastic glass, but it is almost equally applicable to glass of the Roman period.

This in itself would have led to an extreme variety in the coloration of Roman glass. When, in addition, it is remembered that age and weathering have played their part in diversifying the visible tints, it need cause no surprise to find that such tints are infinite.

The details of the methods and of the ingredients used to attain the colours found among the present collection of glass cannot be surely determined without chemical analysis of typical pieces, but the broad outlines are fairly certain from published analyses of other Roman glass from Egypt.<sup>1</sup>

All glass-sands contain some proportion, usually about one to three per cent., of iron. This is sufficient to give the metal a greenish colour. If it is desired to make a colourless glass, some neutralizer for the iron content is necessary. In modern glass-making manganese is often added for this purpose. Lucas says<sup>2</sup> that some Egyptian sands contain this neutralizing agent in their natural state, and this suggests that colourless glass in the first instance may have been a natural outcome of the use of such sands. But yellow and purple tints are also produced by the use of varying quantities of manganese as colouring matter, and its use for this purpose in ancient Egypt has been proved by analyses.<sup>3</sup> It looks, therefore, as if the Roman workers realized the value of this agent, and knew that a little of it would produce colourless or almost colourless glass, more of it would produce yellowish tints, and more still would give purple tints. The fourth main colour amongst the blown glass in the Catalogue is blue. Whether this was produced by adding copper or cobalt is uncertain.<sup>4</sup> Glass of white, red, or black colour<sup>5</sup> is only found in opaque metal for small objects, for decorative coils and threads, and for millefiori ware, and was not used for making complete vessels of blown glass.

The actual naming of colours must always be guided by subjective criteria, and no two persons will be found to agree on such questions. It cannot therefore be hoped that the colour nomenclature adopted in the Catalogue will prove an absolute guide to the reader, but it may be hoped that it will guide him relatively. Various colour groups are first distinguished, the principal being

<sup>1</sup> Lucas, *l.c.*; analyses are quoted *ibid.*, Appendix III.

<sup>2</sup> *Ibid.*, pp. 48-9.

<sup>3</sup> *Ibid.*, pp. 52-3; see also Kisa, p. 262.

<sup>4</sup> Lucas, *ibid.*, p. 51; see also *s.v.* 'Fabric,' p. 23 below.

<sup>5</sup> For the colouring matter used for these shades see *ibid.*, pp. 49, 50, and 53 respectively.

green, yellow, blue, and purple. A graded scale of terminology has been employed within each colour group. This, taking green as a specimen, works out as follows, proceeding from light to dark:

Greenish colourless  
 Greenish  
 Pale green  
 Light green  
 Green  
 Dull green  
 Dark green

In describing mixed colours the predominant colour is always mentioned last. That is, 'yellowish green' means 'green with a yellow tint,' while 'greenish yellow' means 'yellow with a green tint.'<sup>1</sup>

It will be noticed that the word 'colourless' occurs very frequently, especially in speaking of the glass of fabrics 1 and 2. Strictly, there can never be a really colourless glass, for all glass, even the best modern table and optical ware, preserves a trace, however slight, of the greenish colour caused by the iron in the glass-sand. Glass which shows no trace of coloration except at an edge or fracture is called 'colourless,' and if the tinting visible at the edge or fracture is at all noticeable it is described as 'colourless with greenish tinge,' 'colourless with yellowish tinge,' and so forth. Where a piece is labelled 'greenish colourless' or 'yellowish colourless' it means that it bears a deeper tinge of green or yellow which is visible on the plane surface as well as at the edges. Unfortunately modern workers, and specially makers of stained-glass windows, have adopted the term 'white' for colourless glass of this type, but such a usage is very misleading, and is to be deprecated. In the Catalogue the term 'white' always means opaque white glass.

#### B. PRESERVATION

If a vase has been preserved in an undamaged state it is described in the Catalogue as 'intact'; if damaged in any way, its present condition is briefly stated, e.g., 'cracked,' 'broken and mended,' and so forth. A distinction has been drawn between the terms 'restorable' and 'reconstructible': 'restorable' is held to mean that enough fragments are preserved to enable a drawing of the complete shape

<sup>1</sup> Such mixed colours are commoner in post-Constantinian glassware in Egypt than in the earlier wares. The same is true in other provinces; see Kisa, p. 429.

to be made; 'reconstructible' signifies that enough fragments are preserved to enable the actual vase to be rebuilt.

Usage scratches and stains are only mentioned when they are very noticeable.

#### C. WEATHERING

The term 'weathering' is applied to any change for the worse on the surface or in the internal texture of glass that is caused, during the passage of time, by contact with outside influences or by internal decomposition. The term covers, therefore, a wide range of phenomena.

There can hardly be a piece of glass as old as Roman which has not undergone some change of this nature, but in many instances, particularly on glass preserved in a country like Egypt where decomposing agencies in soil and climate are notoriously slight, such changes would only be visible through a microscope. In the Catalogue it is only when they are visible to the naked eye, as they are to a greater or less degree on about half the examples listed, that traces of weathering are recorded.

The following are the main varieties that occur:

1. *Dulling*. The simplest type of weathering, in which the glass loses its original clarity and transparency and becomes merely translucent. This is easy to distinguish from dulling that is due to scratches or stains. It may occur on glass of all fabrics.

2. *Strain cracking*. An infinite number of small cracks running right through the glass in all directions which finally give it a sugary appearance and cause the vessel to disintegrate. Strain cracking occurs chiefly on fabrics 1, 2, and 9, but examples are known on all fabrics. It is really a devitrification<sup>1</sup> caused by too speedy annealing or cooling of the vessel after manufacture. Unless the glass is cooled very slowly, under subjection to a gradually diminishing temperature, the exterior of the walls will cool more quickly than the interior, and will therefore contract more quickly; such uneven contraction produces variation in strain which in course of time causes these cracks.

3. *Frosting*. A network of small cracks on the surface of the glass, resembling very greatly the patterns made by frost on a window-pane. It is commonest on glass belonging to fabrics 1 and 2, but also occurs fairly frequently on fabric 3 and less frequently on fabrics

<sup>1</sup> On devitrification see Kisa, pp. 260-1.

4, 5, 6, and 7. Frosting, like strain cracking (no. 2 above), is a devitrification of the glass caused by too speedy annealing.

4. *Iridescence.*<sup>1</sup> A variegated coloration of the surface of glass, giving a rainbow-like effect, sometimes occurring alone, sometimes as a concomitant of other types of weathering. When found alone it is first visible in filmy patches. In a more advanced state it begins to flake off. Finally, in its most virulent form, it causes a powdery disintegration of the vessel owing to continual flaking of the surface. On Roman glass from Egypt it rarely reaches this advanced state. It appears occasionally on all fabrics, but most commonly on fabrics 3, 4, 5, 6, 7, and 8. When found as a concomitant of other types of weathering it is no longer a true flaky iridescence, but is merely an optical effect caused by uneven refraction of light from a cracked or a pitted surface.

5. *Milky or enamel-like weathering.* Patches or streaks, usually of opaque white, appearing on the surface and gradually eating more and more deeply into the walls of the vessel. In its more virulent forms it may be black or brown in colour, or may even have a mottled, polychrome appearance. In its incipient stage, when visible merely as small spots or streaks of white, it is termed 'milky weathering,' and may be confused sometimes with 'stone' (p. 12). The chief difference between the two is that patches of weathering always start on the surface, whereas blobs of stone may occur both internally and externally. After a patch of milky weathering has eaten some distance into the wall of the vessel it begins to flake away in small crystals, leaving pits behind. This stage is termed 'milky-pitting weathering,' or, if numerous pits have already appeared, 'milky-pitted weathering.' The most extreme form, 'enamel-like weathering,' appears as a thick coating varying from white to brownish black in colour over a large part or the whole of the surface of the vessel. This, too, chips off in crystals, leaving behind highly iridescent pits. Milky and milky-pitting weathering are commonest on glass of fabrics 1, 3, 8, and 9, but may occur on any fabric. Enamel-like weathering hardly occurs except on fabric 9.

These weatherings are due to a variety of causes, not all of which are equally well known or easily determinable. Among external influences which produce them at times in some form or other are air, water, sunlight, impurities in the soil, and habitation-refuse;

<sup>1</sup> On iridescence see Kisa, pp. 303 ff.

while the chief internal causes are peculiarities in the composition of the batch and faulty technique of manufacture. But these internal and external agents interact to a considerable extent and at times even neutralize each other, so that it is quite impossible to foresee what type or degree of weathering will be produced on a piece of glass after preservation for a fixed time under seemingly fixed circumstances.

It will appear from a study of the glass in the Catalogue that certain varieties weather more quickly than others under the same circumstances; but it will also be evident that even a very slight change in environment may produce a markedly different kind or degree of weathering on two parts of the same vessel. For instance, of the fragments from the group numbered 27/C 57 H/C, and all therefore from one room, no. 140 bears milky pitting, nos. 269 and 295 are not weathered, no. 297 is frosted, and no. 715 bears traces of iridescence and strain cracks. Though these were not all necessarily found together, they cannot have been far apart. Again, there are numerous instances where fragments of the same vessel have weathered differently; for example, no. 180, with iridescence on one fragment and milky weathering on the other, no. 215, where one fragment is very much more weathered than another contiguous one, and no. 410, where one fragment is dulled with traces of iridescence, while the remainder are covered with a powdery, iridescent, milky film. And there are even instances where a single fragment bears variations in weathering, for example, no. 382, frosted and milky, and no. 636, frosted and iridescent. No strict rules can therefore be formulated. The causes and effects of weathering are as manifold as they are elusive.

#### D. MATERIAL

By the term 'material' is meant the condition and outward aspect of the metal at the time of manufacture. 'Material' is distinct from 'fabric,' which refers only to the chemical composition of the batch; and it does not include any of the characteristics of the metal which are due to weathering, and were not present when the glass was first made.

The material of the glass from Kôm Aushîm is neither better nor worse than that of Roman glass from elsewhere. Such glass compares favourably with most glass made prior to the nineteenth century, for it was only then, when mechanization of the industry and improved

knowledge of technology enabled workers to have far greater control over the processes of manufacture, that good glass, reasonably free from impurities, began to be made in any quantity.

Ancient glass as a whole is liable to contain bubbles, pieces of grit, and other impurities such as the modern worker is able to eradicate from the metal, if he chooses to do so, before he begins to work it up into a finished vessel.

The quality of the glass varies very much from fabric to fabric: so much so that material is one of the principal criteria upon which determination of fabric has been based.<sup>1</sup> It is important, therefore, in judging a piece of glass, that the various impurities it contains should be accurately noted. If a piece contains no visible impurities, its material is described as 'excellent'; if the impurities are hardly noticeable, it is described as 'good' or 'fair.' In all other cases a short statement of the impurities which occur is given. The following are the chief varieties:

1. *Bubbles.* Internal pockets of air in the metal. On good wares such as fabrics 1 and 2 these are usually few in number and of the size of a pin-prick; on bad wares such as fabrics 8 and 9 they are often very large and so numerous as to cover the whole expanse of the vessel. On wares of intermediate quality they are, as a rule, sufficiently prominent to cause the glass to merit the term 'bubbly.' In general, parts made of drawn glass, that is coils, handles, and the like, are far more bubbly than the blown glass of the vessel itself.

2. *Sandy impurities.* Brown blobs or specks of sand. These may be either bits of sand in the batch that have resisted fusion, or bits picked up by the warm vessel after it has been blown. The two varieties may be distinguished easily, for the former are always covered by a vitreous film, while the latter are never so covered.

3. *Black impurities.* Black blobs or specks. These are for the most part internal, and are due to insufficient refining of the batch.

4. *Stone.* Blobs or streaks of opaque white. These may be due to one of two causes. Either they are formed by particles of white clay from the crucible becoming mixed with the batch; or they represent bits of the white scum which forms on the top of the frit after the first fusion, and which has not been completely skimmed off. In the former case the modern technical term for them is 'stone,' in the latter it is 'glass-gall.' But as the two varieties are indistinguish-

<sup>1</sup> P. 21 below.

able to the eye, only one of these terms has been used for both in the Catalogue. 'Stone' is not to be confused with 'milky weathering' (p. 10), which is also opaque white.

5. *Blowing spirals.* Spiral streaks in the glass caused by the rotary motion given to the blow-pipe to prevent the paraison or bulb of metal from bending to one side during the blowing of the glass. They are specially noticeable when the glass is bubbly and full of impurities.

#### E. SHAPE, TECHNIQUE, AND DECORATION

Modern technical terms have been employed wherever possible in describing shape, technique, and decoration. No explanation of these terms will be found in the Catalogue except in a very few instances. Instead, all such as are not readily intelligible have been collected into the following short glossary.

##### i. *Shape*

###### *Rim*

As a general rule the word 'rim' is used in a wide sense to signify the whole of the modelled part at the top of a vase; above the sides in a bowl; above the neck in a flask or bottle. Terms of narrower significance such as 'lip' and 'edge' are only used occasionally, where clarity demands further precision. The word 'mouth' has been avoided except in certain instances in classes XI and XII.

Rims may be 'vertical,' 'outsplayed,' or 'incurved,' according as they continue the alinement of sides or neck or are deflected inward or outward therefrom. The following types of rim occur:

1. *Unworked rim.* The edge of the rim is left sharp and unfinished after the vessel has been knocked off from the unwanted part of the paraison or bulb of metal. Rims that have received some slight grinding in order to protect the hands of the user of the vase are included under this head, and not under (2). Compare no. 393, Pl. XV.

2. *Polished rim.* The edge of the rim is smoothed or ground with a wheel, and not left unfinished as in (1). The term 'polished' is reserved for a carefully finished rim, and merely protective grinding (see (1) above) is not included under this head. Compare no. 408, Pl. XV.

3. *Rounded rim.* The edge of the rim is rounded by reheating in a flame. It is often difficult to distinguish a rounded rim from a rim with a solid fold, type 4 (b). Compare no. 365, Pl. XV.

4. *Folded rim.* The tip of the rim is softened in a flame and folded

over in an outward or inward direction with the aid of a reamer (see ii. 11 below). Folded rims may be (*a*) 'hollow,' where air space is left between the folds (compare no. 356, Pl. XV), or (*b*) 'solid,' where the folds are fused together with no air space between them. Compare no. 343, Pl. XV.

5. *Coil rim.* The rim is decorated with one or more coils of glass trailed on horizontally or spirally at or near the edge. Compare no. 348, Pl. XV. In the present collection this type of rim is always combined with types 3 or 4 (*b*), never with any of the other types.

6. *Moulded rim.* The rim is outsplayed and finished off in the form of a simple picture-frame moulding by polishing. Compare no. 170, Pl. XII.

#### *Side*

The term 'side' includes all the vase which lies between the rim and the base. In the Catalogue the word is only used in connexion with open vases, classes I-VII. For the remainder the side is divided into three portions, neck, shoulder, and body (see below).

The sides of a bowl or beaker may be 'inward-sloping,' 'vertical,' or 'outsplayed,' from bottom to top; in addition, their exterior contour may be 'concave,' 'straight,' or 'convex.'

#### *Neck*

In all cases where there is a distinct narrowing of contour on a vase between the body and the rim, the part so narrowed is termed 'neck.' Necks may be 'short' or 'tall.' The following four types should be distinguished:

1. *Concave neck.* The walls of the neck are concave on the exterior. If a concave neck is very short, the term 'constricted neck' is used.

2. *Funnel neck.* The walls of the neck are straight and taper downward.

3. *Cylindrical neck.* The walls of the neck are straight and vertical.

4. *Tapering neck.* The walls of the neck are straight and taper upward.

For the explanation of 'neck constriction,' see ii. 2 below.

#### *Shoulder*

On flasks and bottles the horizontal or sloping part at the top of the body, where it bends inward to join the neck, is termed 'shoulder.'

Cylindrical bottle-flasks and jugs often have a bulge running round the top of the body. This is called a 'shoulder roll.' For an example see no. 739, Pl. XIX.

### *Body*

The following terms are used to denote various shapes of body of flasks and bottles:

1. *Globular or spherical body.* The body is an almost perfect globe or sphere.
2. *Ovoid body.* The body is egg-shaped, with its greatest diameter at or near the top.
3. *Oval body.* The body is oval, with its greatest diameter at or near the middle.
4. *Inverted-piriform body.* The body is in the shape of an inverted cone or pear, with its greatest diameter near the bottom.
5. *Bulbous body.* The sides of the body are strongly convex, but are not regular enough to be classed with any of the foregoing shapes. If the body after being blown into a bulb has been flattened greatly by pressure, it is described as 'squat bulbous.'
6. *Cylindrical body.* The sides of the body are vertical and its horizontal section is circular.
7. *Rectangular body.* The sides of the body are vertical and its horizontal section is square, rectangular, or polygonal.

### *Base and bottom*

The term 'base' includes all that part of a vase which underlies the sides. It has been found convenient, especially in classes I-IV and VII, to employ the word 'bottom' in a narrower sense to denote that part of the base which is outside the actual base ring or stem.

The following types of base occur:

1. *Convex or rounded base.* The base is plain, and is convex on its under side. For an example see no. 688, Pl. XIX.
2. *Concave base.* The base is plain, and is made concave below by pressure or by a 'kick' (see ii. 5). For an example see no. 696, Pl. XIX.
3. *Coil base.* A thread or coil of glass is trailed on and forms a ring on which the vase stands. For an example see no. 704, Pl. XIX.
4. *Pad base.* A base ring has been formed by applying as a pad the bottom of another parison, upside down, underneath the body

of a vessel. The lips of the pad are splayed out to form a ring on which the vessel stands (Fig. a). For an example see no. 712, Pl. XIX.

5. *Base with true ring*. A base ring has been formed by the addition of a ring of glass, knocked off a cylinder, underneath the body of a vessel (Fig. b). For an example see no. 221, Pl. XIV.

6. *Pushed-in base*. A base ring has been formed by blowing a secondary bulb below the body of the vessel (Fig. c) and then forming a cut-out ring (see ii. 4) by pushing the secondary bulb up from below (Fig. d). The resulting base ring may assume a variety of contours but the most common type is the tubular base ring (no. 7). For an open example see no. 267, Pl. XIV.

7. *Tubular base ring*. This (Fig. e), though it has the appearance of a hollow tube trailed on the base of the vessel, was certainly produced by cutting-out as in 6 above, and afterwards pinching the folded parts to a tubular shape. For an example see no. 266, Pl. XIV.

8. *Toed base*. A set of three or more small toes have been pinched out from the glass at the base of the vessel. For an example see no. 682, Pl. XIX.

9. *Stemmed base*. A base has been formed by drawing out the glass at the bottom of the body into a twisted stem, outsplayed into a foot stand below. For an example see no. 356, Pl. XV.

### *Handle*

All handles are of drawn glass, and are added separately to the vessel and not made from the main paraison. The following types occur:

1. *Coil handle*. A handle made of a coil of glass roughly circular in cross-section. The shapes of coil handles are very various. Special names have been assigned to two of them: (a) 'side-whisker handle' (*cf.* no. 509, Pl. XVII), in which the coil ends in a long tail extending down the side of the vessel and scalloped at intervals by pinching, and (b) 'dolphin handle' (*cf.* no. 767, Pl. XX), a ring handle with circular opening coiled in the semblance of a curled-up dolphin. Type (a) is particularly common in class VIII, type (b) is characteristic of class XII A.

2. *Flat handle*. A handle made of a flattened coil of glass.

3. *Ribbed handle*. As 2, but with two or more raised ribs, vertically, on exterior.

ii. *Technique*

The following are the principal technical terms used in describing the technique of manufacture:

1. *Blowing spirals.* In blowing a vase it is necessary to rotate the warm paraison rapidly. Such rotation causes any bubbles, impurities, or imperfections of colour to appear as spiral streaks, which are called 'blowing spirals.'

2. *Constriction.* Slight indentation in the walls of a vessel made with a modelling tool or reamer (see 11 below), as, for example, at the base of the neck of the flasks of class IX A, is termed 'constriction.' See also 6 below.

3. *Cutting in.* When, during blowing, a roll or fold is made inward on the inside of the walls of a vessel, as, for example, at the base of the neck of flasks, class IX (*cf.* no. 566, Pl. XVIII), the process is termed 'cutting in.'

4. *Cutting out.* Equivalent to 'cutting in,' but the roll or fold is on the outside of the walls of the vessel, outward, as, for example, on tubular base rings (see i. 7), and on the rims of flasks and bottles such as nos. 587 and 709, Pls. XVIII and XIX.

5. *Kick.* Many bases have been pricked or pushed into a deep concavity with a reamer (see 11 below). A concavity of this kind is called a 'kick.'<sup>1</sup> It may be (a) 'pointed,' if the tool has been held vertically (*cf.* no. 228, Pl. XIV), or (b) 'flat-edged,' if the tool has been held in a sloping position (*cf.* no. 15, Pl. XI).

6. *Mark of modelling tool.* This is a general term given to any groove on the surface of the glass made with a reamer (see 11 below). See also 'Constriction' and 'Slanting impressions.'

7. *Pinching.* A pair of pucellas or tongs was used, not only for decorative pinches (see C below), but also for structural work; for example, in making the spouts and trefoil mouths of jugs, in pinching in the long sides of some of the oval dishes (e.g., nos. 15 ff.), and in making indents (see iii. 2 (c)).

8. *Polishing marks.* These are circular or rotatory marks or scratches made on the surface of the glass with a polishing wheel. They are found, for instance, on the polished bowls of fabric I and millefiori ware, and also on polished rims (see i. 2).

9. *Pontil technique.* A pontil or punty is a tool used for holding a glass vessel at the bottom while the top is finishing off after blowing.

<sup>1</sup> Compare the very pronounced kick on most modern wine-bottles.

It is an iron rod which is tipped with a cap or wad of molten glass to enable it to adhere to the vessel. When the fashioning is complete, the pontil is snapped off, but it always leaves a rough mark, and usually leaves part of its cap as well. In modern practice the pontil mark is ground away with a wheel, but Roman glass-workers rarely troubled to do this, and when a pontil has been used (except when employed with a 'post,' see 10 below) obvious traces of it are left.

The pontil mark usually appears on top of the reamer mark in the kick (see 5 above). This is to be expected, for any fashioning of the base with a reamer would naturally be done while the vessel was still attached to the blow-pipe, and before there was any need to use the pontil. A pontil was of course dispensed with in the case of vessels with unworked rims (e.g., class VI, nos. 436 ff.). It was also sometimes dispensed with on large vases which could be held in the hand during manufacture.

10. *Post technique.* Sometimes, instead of being applied direct to the base of a vessel by means of a cap, the pontil is affixed to a flat plate of glass called a 'post,' and then this plate is attached to the base or base ring of the vessel (Fig. f). When the post is snapped off it leaves traces of roughness or apparent fracture behind. On the earlier and better wares an attempt has sometimes been made to polish this roughness away; on later specimens no such attempt has been made, and the roughness is still very obvious.

11. *Reamer.* The reamer is a flat, triangular, metal tool used for many purposes by glass-blowers. Its edge may be used for out-splaying rims and bases, and its point for grooving, ribbing, and puncturing. It was also used for kicking a base (see 5 above).

12. *Slanting impressions.* Series of sloping grooves, either running one way only or criss-cross, are found on the exterior of many base rings. Three types are distinguished in the Catalogue: (a) 'faint,' (b) 'well-marked,' and (c) 'criss-cross.' The first, (a), are such as would naturally be left by the reamer after it had been used for smoothing out the base ring. The second and third types, (b) and (c), show how the glass-maker turned the markings to decorative uses by accentuating them instead of trying to smooth them away.

### iii. *Decoration*

Four methods of decoration may be distinguished:

1. *Blowing into a mould.* Nowadays moulds are made of metal; in Roman times they were probably made of wood or clay. They

might be of one piece or more than one (then termed 'bipartite,' 'tripartite,' &c.) according to the intricacies of the pattern and shape of the vessel.

Blowing into a mould occurs either when the vessel receives its final form or at an earlier stage. If the former, the vessel is termed 'mould-blown,' and the patterns left by the mould, which may be of the most various sorts, simple or complex, are termed 'mould-blown patterns.' For examples see nos. 628-9, Pl. XVIII. Often, however, at an earlier stage of manufacture, the paraison is given a pattern of ridges and furrows, or 'corrugations,' by being blown into a cylindrical or tapering mould of that form. The vessel is afterward fashioned into its final shape by free blowing and modelling, and the corrugations which it receives from the mould expand or contract according to the contours of the vase. For examples see nos. 608 and 612, Pl. XVIII. On the mould, of course, the corrugations are always vertical. They may be made curved or S-shaped on the vessel by sharply twirling it when on the blow-pipe.

2. *Tooling or stamping the glass when warm.* The following variants occur under this head:

(a) *Pinches.* The glass is gathered with pucellas or tongs into raised ridges or knobs. Compare no. 259, Pl. XIV.

(b) *Ribs.* The glass is furrowed with the point of a reamer. The pressure of the tool causes the displaced glass to form a raised rib. Compare no. 544, Pl. XVII.

(c) *Indents.* The walls of the glass are indented with the tips of the pucellas. Indents may be of various forms and sizes. A common variety is the 'thumb indent' (*cf.* no. 376, Pl. XV), a form of decoration copied by Roman glass-workers from pottery-making. On pottery it was actually made by pressure with the thumb; on the warm glass, of course, an instrument would be used instead, but it seems good to retain the term 'thumb indent' to show the connexion of the glass decoration with its pottery counterpart.

(d) *Stamped patterns.* Patterns impressed on the walls of vessels with the aid of a stamp are unknown among the vessels in the present collection, but they occur on some of the small objects in class XIV (e.g., no. 992, Pl. XXII).

3. *Engraving the glass when cold.* Engraving on glass was accomplished by means of a rotating wheel fed with water and corundum. Three varieties of the technique occur:

(a) *Cuts.* Broad grooves and facets. These represent the technique of engraving at its best. For examples see nos. 408-9, Pl. XV.

(b) *Incisions.* Single marks of the wheel. These may occur as shading marks within the facets of (a) (*cf.* no. 411, Pl. XV), or else in groups, horizontally (*cf.* no. 329, Pl. XV). In the latter form they probably represent an inefficient attempt at a horizontal groove, when, instead of the wheel running round in the same groove and producing a deep cut, it has made a series of faint lines side by side.

(c) *Scratches.* Groups of marks made by the wheel in the semblance of the grooves and facets of (a). These occur always on late vases, and seem to be careless or inefficient attempts at producing true grooves and facets. For examples see nos. 739-40, Pl. XIX.

4. *Applying or trailing on glass from a secondary pot of metal.* In the Catalogue, if the applied glass is the same colour as the vessel, it is termed 'similar glass,' if it is different, its colour is mentioned. Two varieties of this technique occur:

(a) *Coils and threads.* The name 'coil' or 'thread' is given to a strip of warm, drawn glass trailed on horizontally (in a single revolution) or spirally (in several revolutions) round the vessel. If the strip is thin it is called a 'thread,' if it is thick it is called a 'coil.' Such coils or threads, after being trailed on the vessel, might be left in relief, or else marvered in flush with the surface while still warm.

(b) *Barbotine.* The term 'barbotine,' though strictly belonging to all applied decoration, is arbitrarily confined to forms of such decoration other than coils and threads. In the Catalogue the commonest form of barbotine is the 'blob,' a dab of glass applied in a warm state to the vase and fused in by reheating, but left in relief and not marvered in flush (*cf.* no. 457, Pl. XVI). More elaborate barbotine decoration occurs very rarely (e.g., no. 492, Pl. XVI).

#### F. FABRIC

'Fabric' as applied to a glass vessel<sup>1</sup> denotes the chemical composition of the batch, and is therein distinct from technique, which refers to the method of working the metal into the finished vessel, and from material which describes the outward characteristics of the metal.

<sup>1</sup> No attempt has been made to distinguish the various fabrics amongst the objects in class XIV. Some of them belong to the same fabrics as are found among the vessels, classes I-XIII; others are different. In any case, the number of fabrics that occurred in class XIV was too great to render their discrimination either easy or useful.

A study of the glass from the first year's campaign soon suggested that it could be divided into nine well-marked fabrics. This determination was based in the first instance on considerations of colour, and of the goodness or badness of the metal. Later it was found that certain shapes, certain varieties of weathering, and certain techniques were more typical of some fabrics than of others, and so these criteria proved to be a help, if used with caution, in apportioning specimens to their respective fabrics. But it should be emphasized that it is the composition alone that is the real determining factor in assessing the fabric of a piece.

A completely correct and incontrovertible division into fabrics could not be accomplished without the aid of numerous chemical analyses of fragments. Most unfortunately it has not proved possible to obtain analyses from any of the chemical authorities to whom an appeal was made, and so it must be remembered that the division into fabrics adopted in the Catalogue is a provisional one, being based merely on the outward aspect of the glass. If it has accomplished nothing else, such a division has at least been of considerable assistance in cataloguing and describing the glass, and in equating, from the reader's point of view, pieces of similar aspect. A certain confidence in its essential soundness was developed when it was seen that the original division into nine fabrics, based though it was on the finds of the first year only, fitted with but few exceptions not only the rest of the glass in the Catalogue but also the vast majority of glass of similar date found elsewhere in Egypt. The exceptions are the bowl fragments of millefiori glass<sup>1</sup> and a few pieces of good monochrome glass or glass with marvered-in threads of a different colour,<sup>2</sup> all of which are stray survivals of first-century Alexandrian fabrics.

It is not claimed, of course, that it is always possible to be sure of the correct assignment of each individual piece of glass to one of these nine fabrics. The fabrics shade off gradually into one another, and border-line pieces are often met with. Equally, it is not claimed that all these fabrics represent groups of glassware essentially different in composition from each other. Indeed, it is more than likely that chemical analysis would prove that there is very little difference in composition between some of them.<sup>3</sup>

<sup>1</sup> Nos. 193-203.

<sup>2</sup> Nos. 276, 699, 806, 811, and 814.

<sup>3</sup> For example, the colourless wares, nos. 1 and 2, and the table wares, nos. 3-5.

The nine fabrics are:

1. Colourless ware <i>a</i>	6. Purple ware
2. Colourless ware <i>b</i>	7. Dark blue ware
3. Table ware <i>a</i>	8. Green, bubbly ware
4. Table ware <i>b</i>	9. Bottle ware
5. Table ware <i>c</i>	

Fabrics 1 and 2 are very similar and may be treated together. They are early wares<sup>1</sup> of good material, well made, of colourless<sup>2</sup> to greenish colourless glass, with a tendency toward simple shapes of bowls, beakers, and flasks. Their typical weathering is frosted or milky. Iridescence and milky-pitting are rare. Some late examples occur of both fabrics which are more bubbly than the average, and are also inclined to contain more impurities: such are listed as 'debased fabric 1' or 'debased fabric 2.' It is possible that these two fabrics are in reality only one, and that analysis would show no distinction between them.<sup>3</sup> Pending analysis, however, a distinction has been made, based on the following considerations:

- (a) Colourless *a* pieces are thicker than those of colourless *b*.
- (b) Colourless *a* tends to be duller glass than colourless *b*.
- (c) Colourless *a* vases are the most symmetrical and highly finished shapes in the collection, being usually polished and wheel-turned after blowing or moulding. Those of colourless *b*, while on the whole very symmetrical, are not so highly finished, being usually plain-blown and unpolished.
- (d) Colourless *a* tends to milky weathering, if any, whereas colourless *b* is more commonly frosted.

Fabrics 3, 4, and 5 form a second group, which it is convenient to treat together. They are late wares<sup>4</sup> in various shades of green and yellow, and are more elaborate in shape, and contain more bubbles and impurities than the earlier, colourless wares. Their typical weatherings are frosted, iridescent, and milky-pitted. It is not always easy to determine to which of these three wares a particular vase belongs.

<sup>1</sup> See *s.v.* 'Dating,' pp. 31 ff.

<sup>2</sup> On the use of the term 'colourless' see p. 8.

<sup>3</sup> Examination of the glass labelled fabrics 1 and 2 in this Catalogue led Mr. W. A. Thorpe and the author to enquire whether any of it had a lead base or whether it was all soda-lime glass of the same basic composition as the glass of the remaining fabrics. An acid test carried out by them on six specimens of each of the two fabrics proved conclusively that there was a complete absence of lead in every instance.

<sup>4</sup> They are probably not pre-Constantinian. See *s.v.* 'Dating,' pp. 31 ff.

Table ware *a* is the best, being the least bubbly and the least liable to contain impurities. It is the only one whose vases ever approach a colourless aspect, the predominant shades being greenish colourless and yellowish colourless. Indeed there are numerous pieces in the collection which may belong either to fabrics 1 and 2 in their later and more debased state, or to fabric 3. The shapes, which principally take the form of dishes, bowls, lamps, and flasks, are usually symmetrical and are more carefully fashioned than those of wares *b* and *c*; the most typical weathering is frosted.

Table ware *b*, which is predominant in all the large hoards of table glass, is very homogeneous and shows little variety either in shape or in technical processes. It is usually rather bubbly and full of both black and sandy impurities. The vases, which are found in all classes except XIII, are often exceedingly misshapen. Green and yellow shades are usual, and the most typical weathering is iridescence.

Table ware *c* is, on the whole, the worst of these wares, being full of bubbles and impurities. It rivals ware *a* in none of its characteristics, and is superior to ware *b* only in greater symmetry of shape. The predominant shades are deep greens and yellows, and the usual weathering is milky-pitting.

Fabric 6 is very nearly allied to the three table wares, and is distinguished from them by its purple tints alone. The colour, which was probably produced by the addition of manganese,<sup>1</sup> may vary from almost colourless with but a faint tinge of purple to a deep wine-colour, just as there are various depths of green and yellow colour in the three table wares. Fragments are not common, but most of the shapes typical of the table wares occur, and specimens may be found in classes I, II, III, IX, and XI.

Fabric 7 is most closely allied to table ware *c*, and is probably merely a colour-variant of it, for all the dark blue fragments which exist are akin in shape, technique, and material to some specimen of that ware. The colour, which was produced by the addition of either copper or cobalt,<sup>2</sup> is always blue or deep blue, never bluish colourless.

<sup>1</sup> Lucas, *Materials*, p. 52.

<sup>2</sup> *Ibid.*, pp. 50-1. Professor W. E. S. Turner, head of the Department of Glass Technology, Sheffield University, has been kind enough to have qualitative analyses made of seven specimens of this ware (nos. 357, 503, 635, 674, 676, 711, and 796). His report is as follows: 'All seven samples contained copper but all of them also contained cobalt. The amounts of the latter, however, were in practically all cases

Fabric 8 is akin to no other ware and is easily recognizable by the quantity of bubbles it contains. It varies in colour from very faint green or bluish green to green or blue green. Here, as in the colourless wares, frosting and milky weathering are the most usual. In shape also it is most nearly allied to those wares, so that it was probably the cheap glass of the earlier period.<sup>1</sup>

Fabric 9 is the coarsest and heaviest of all, and stands in a class apart, not only by reason of its poor quality, but also by reason of shape, colour, and weathering. The ware is green, of shades varying from light to dark, full of bubbles, stone, and other impurities, carelessly made as a rule, and obviously the result of mass production for commercial uses. The prevailing forms are rectangular (more rarely cylindrical) bottles (XI) and toilet-bottles (XIII). The typical weathering is enamel-like pitting. As the ware is found in conjunction with all others, both early and late, it was probably manufactured throughout the whole period covered by this collection.

## CONCLUSIONS

### A. DATING

Before the excavations at Karanis had begun it was hoped that a concentrated campaign spread over a number of years on a stratified site such as the mound of Kôm Aushîm appeared to be would supply a much needed basis for the accurate dating of the archaeological miscellanea of Roman Egypt.

But in a country like Egypt, where conservatism has always been rife and archaeological types are notoriously long-lived, it is a hard task to establish even a relative sequence within a series of types that spreads from first to last over but a few centuries: it is even more difficult to ascribe absolute dates within those centuries to the various stages in the sequence.

The finds at Karanis, apart from objects such as papyri, ostraca, and coins, which usually bear their date upon them, are no exception to this general rule, and even after a detailed study has been made of the massed results of five years' excavation it is only possible to

small, in several cases, traces only. Only in one instance, namely no. 676, was cobalt present in fairly definite quantity. It might well be that in the other cases the presence of cobalt was merely due to the use of a mineral contaminated with traces of cobalt, and that this colouring agent was not specifically added.<sup>1</sup> We can only conclude that both these colouring agents were known to and used by the Romano-Egyptian workers.

<sup>1</sup> See, further, *s.v.* 'Dating,' pp. 31 ff.

make tentative suggestions as to the relative and absolute dates of any given series.

The chief reason for this is that the stratification of the site proves to be far more complicated than was anticipated. The houses lie, it is true, in some few sections of the Kôm in distinct layers with sterile strata in between, but over most of the area so far excavated the different levels have been telescoped to such an extent that it is usually difficult and sometimes impossible to draw a dividing line between them.<sup>1</sup> Many of the individual houses were durable enough to last, with sundry reconstructions necessitated by the continual rise in street levels, throughout a century or even two. For instance, the topmost storeys of well-built houses such as c 42 and 51 were utilized even as late as the A period, when they became houses 252 and 227 respectively.<sup>2</sup> Rooms that belonged to the ground floor in the first occupation became cellars in a later one, and so on, for some of these houses of the C period had as many as three floors and a cellar, and it will be easily understood that their upper storeys could be used long after the lower had been completely engulfed by the rising levels of street débris and drifting sand. Because of this, the internal stratification of individual rooms was never clear-cut. Owing to the unstable, sandy soil the exact position of floor levels was difficult to determine except where a clue was given by a still-existing threshold. The gradual rise of a floor level was of course quite impossible to trace.

These remarks will suffice to show the difficulties encountered in giving sequence dates to the Karanis material in general. The sequence dating of the glass presents a particular problem of its own, for it must be remembered that glass in Roman Egypt was a luxury—at any rate till the fourth century<sup>3</sup>—and was likely to be carefully preserved and handed down from generation to generation;<sup>4</sup> even when a vessel was broken it was sometimes refashioned and re-used.<sup>5</sup>

Thus it is never safe to assume that the date of manufacture of a piece of glass is even close to, much less the same as, the date of the occupation level in which it was found. One of the finest

<sup>1</sup> *Topographical Report*, pp. 4 and 39.

<sup>2</sup> *Ibid.*, pp. 53 and 57.

<sup>3</sup> See pp. 40–1 below.

<sup>4</sup> Contemporary evidence of the value attached to glass at this period is given by St. Augustine, *Sermo*, 17, 7: 'Nonne fragiliores sumus quam si vitrei essemus? Vitrum enim etsi fragile est, tamen servatum diu durat: et invenis calices ab avis et proavis, in quibus bibunt nepotes et pronepotes. Tanta fragilitas custodita est per annos'; quoted by Trowbridge, *Philol. Studies*, p. 165.

<sup>5</sup> Compare nos. 176–7, and Cairo J 46481 (see App., p. 317).

fragments of cut ware in the collection (no. 410) comes from an A-period house, yet it is undoubtedly much earlier in date of manufacture; and numerous similar instances might be adduced.

The only safe method of arriving at a tolerably accurate system of relative or sequence dating is to analyse the finds of glassware from several typical rooms of each level. The rooms used have been chosen at random, save for the stipulation that they shall provide groups of glass as varied in nature as possible. In all but one instance the vessels mentioned were represented only by fragments, though they are quoted as complete for the sake of simplicity.

Such analysis produced the following results:

26/B 2 H/YI.	Fabric 1.	Three plates on base ring, almost colourless (including no. 77).
	Fabric 1	Five beakers on base ring, almost colourless (including or 2. no. 397).
	Fabric 2.	Plate on base coil, almost colourless. Bowl on base ring, almost colourless (no. 264). Five bowls or beakers, almost colourless (including no. 208).
		Two beakers with thumb indents, almost colourless. Goblet with wheel incisions, almost colourless (no. 418). Two small flasks, almost colourless. Large flask with funnel neck, almost colourless.
	Fabric 8.	Flask, bluish green (no. 569). Toilet-bottle (XIII H), greenish colourless.
	Fabric 9.	Rectangular bottle, green (no. 752). Several toilet-bottles, green.
26/B 4 D/R.	Fabric 1.	Plate on base ring, almost colourless. Oil-flask, almost colourless.
	Fabric 2.	Numerous bowls and beakers, almost colourless (including nos. 349, 350, 373). Several small flasks, almost colourless.
	Fabric 8.	Beaker with thumb indents, dull green (no. 393). Two flasks, greenish colourless and green. Toilet-bottle (XIII H), greenish colourless (no. 841).
	Fabric 9.	Rectangular bottle, green. Two toilet-bottles, green.
26/B 9 Q/C.	Fabric 2.	Beaker, almost colourless (no. 371). Flask with horizontal cuts, almost colourless (no. 576).
	Fabric 2?	Bowl, almost colourless (no. 344).
	Fabric 2 or 3.	Oval dish, almost colourless (no. 28 A). Fabric 3. Bowl, greenish colourless. Fabric 4. Bowl, green. Fabric 9. Lamp, yellow. Fabric 9. Toilet-bottle, green.

26/B 12 L/G.	Early ware.	Jar, dark green (not any listed fabric).
	Millefiori.	Bowl (no. 194).
	Fabric 2.	Plate, almost colourless (no. 81). Two bowls, cut decoration, almost colourless (nos. 188, 206).
		Bowl or beaker, almost colourless.
	Fabric 2?	Plate, moulded rim (no. 76).
	Fabric 5.	Lamp, wheel incisions, yellowish green. Flask, yellowish green with green base coil.
	Fabric 6.	Bowl, deep purple. Bowl, purple with bluish green coils (no. 302).
		Lamp with wheel incisions, purplish.
	Fabric 9.	Toilet-bottle, green.
24/5006 A/AA and AB.	Fabric 1.	Some bowls, moulded rims, almost colourless (including no. 305).
	Fabric 2.	Numerous beakers, almost colourless. Numerous small flasks, almost colourless.
	Fabric 2 or 3.	Flask with pinches round base, greenish colourless (no. 550).
	Fabric 2, 3, or 8.	Five or more oil-flasks, almost colourless to bluish green (including nos. 767, 772).
	Fabric 3 or 8.	Some beakers, greenish colourless.
	Fabric 3.	Some small flasks, greenish colourless.
	Fabric 3,	Flask, greenish colourless (no. 682).
	4, or 5.	Two flasks with coil bases, bichrome.
	Fabric 5.	Several bowls, dark green.
		Small flask, green (no. 570).
	Fabric 8?	Bowl, bluish green (no. 243). Jug, bluish green (no. 729).
	Fabric 9.	Several toilet-bottles, dark green.
25/5026 B/M.	Fabric 1.	Plate, moulded rim, almost colourless (no. 74). Small flask, almost colourless.
	Fabric 2.	Bowl, cut decoration, almost colourless (no. 185). Three bowls or beakers, almost colourless (including no. 124).
	Fabric 3.	Flask, ribbed, greenish colourless.
	Fabric 4.	Cup on stem, green.
25/5060 A/G.	Fabric 1.	Bowl, moulded rim, almost colourless (no. 174).
	Fabric 2.	Bowl, folded rim, almost colourless (no. 261). Bowl on pad base, almost colourless (no. 309).
	Fabric 2, 3, or 8.	Numerous fragments of bowls, beakers, and flasks, almost colourless or greenish colourless.
	Fabric 4.	Bowl, yellow. Lamp, yellow.
	Fabric 4 or 5.	Several dishes, bowls, and flasks, green.

	Fabric 9.	Rectangular bottle, green. Several toilet-bottles, green.
25/5095 A/B.	Fabric 3.	Two bowls, greenish. Lamp, greenish colourless.
	Fabric 5.	Oval dish, green. Jug, yellowish green.
	Fabric 6.	Two bowls, purplish colourless. Two bowls, purple.
	Fabric 7.	Flask, dark blue.
	Fabric 8.	Bowl, green with similar coils (no. 146).
27/C 41 A/LI.	Fabric 3.	Bowl, greenish colourless. Bowl, light green with similar coil.
	Fabric 4?	Flask, yellowish with bright green coil (no. 622).
	Fabric 4.	Jug, yellow (no. 719).
	Fabric 5.	Two lamps, yellowish green with blue blobs. Two flasks, green.
	Fabric 6.	Flask, purple.
27/C 45 N/O.	Fabric 1 or 2.	Four beakers or bowls, almost colourless (including no. 338). Two flasks, almost colourless.
	Fabric 4.	Flask, yellow (no. 677).
	Fabric 5.	Oval dish, yellowish brown. Bowl, green. Flask, green.
	Fabric 8.	Two beakers with thumb indents, greenish.
27/C 51 J/ZI.	Fabric 1.	Beaker with thumb indents, almost colourless.
	Fabric 2.	Small flask, almost colourless.
	Fabric 2?	Flask, almost colourless with green rim coil.
	Fabric 2 or 3.	Bottle-flask, almost colourless (no. 694). Small jug, almost colourless with blue handle.
	Fabric 5.	Oval dish, greenish colourless (no. 31). Oval dish, green.
	Fabric 6.	Three lamps, yellowish green.
	Fabric 9.	Two bowls, purplish colourless. Toilet-bottle, green.
26/B 27 A/Q.	Fabric 2.	Plate, almost colourless (no. 78). Bowl, cut decoration, almost colourless (no. 207). Bowl, almost colourless, with turquoise coils.
	Fabric 3.	Lamp, greenish colourless. Cylindrical jug, scratched decoration, yellowish colourless (no. 741).
	Fabric 3 or 5.	Oval dish, green with similar coils. Flask, green with similar coil.
26/B 48 A/C.	Fabric 5.	Two bowls, green. Three bowls, yellow. Two lamps, yellow. Flask, yellow.

26/B 48 C/A. Fabric 2 Small flask, almost colourless (no. 586).  
or 3.  
Fabric 5. Oval dish, dark green.  
Fabric 8. Flask, greenish colourless.  
Toilet-bottle (XIII H), blue green (no. 838).

26/B 50 B/F. Fabric 5. Oval dish, green with light green coils (no. 53).  
Several oval dishes, green or yellow.  
Three bowls, dark green.  
Bowl on stem, green (no. 361).  
Numerous lamps, yellowish green, some with blue  
blobs.  
Jug, yellow.  
Numerous other fragments of fabric 5.

27/B 118 J/E. Fabric 1? Bowl or beaker, almost colourless.  
Fabric 2? Flask, almost colourless.  
Fabric 5. Flask, funnel neck, green.  
Flask, brownish yellow (no. 610).  
Two-handled flask, yellow with green coils (no. 794).

28/B 127 C/J. Early Toilet-bottle, dark green with opaque white marvered  
ware. in threads (no. 809).  
Fabric 1? Flask, cut decoration, almost colourless (no. 577).  
Fabric 2. Plate, cut decoration, almost colourless.  
Beaker, almost colourless (no. 369).  
Beaker with wheel incisions, almost colourless.  
Beaker with thumb indents, almost colourless.  
Goblet, cut decoration, almost colourless.  
Flask, almost colourless.  
Fabric 3 Oil-flask, greenish colourless.  
or 8.  
Fabric 3? Oval dish, greenish colourless.  
Fabric 5. Bowl on stem, brown.  
Two lamps, yellowish green.

28/B 167 E/E. Fabric 2. Beaker with thumb indents, greenish colourless.  
Fabric 2 or 3. Oval dish, almost colourless with blue coils (no. 46).  
Fabric 4. Bowl, green.  
Fabric 4? Bowl, green with similar coils (no. 147).  
Fabric 6. Bowl, purplish colourless.  
Fabric 8. Beaker on tubular base, greenish colourless.  
Toilet-bottle, greenish colourless.  
Fabric 9. Toilet-bottle, dark green.

24/102 E/I. Fabric 2. Several beakers, almost colourless.  
Fabric 4. Lamp, green.  
Jar, green.  
Fabric 5. Oval dish, green with dark greenish blue coils at rim  
(no. 58).  
Numerous other dishes, bowls, and flasks, dark green.

	Fabric 7.	Two small fragments.
	Fabric 9.	Two rectangular bottles, green.
24/130 C/H.	Fabric 2.	Small flask, almost colourless (no. 562, complete).
24/130 C/P.		Bowl, cut decoration, almost colourless (no. 213).
		Beaker, cut decoration, almost colourless (no. 383).
		Small flask, cut decoration, almost colourless (no. 574).
		Small jug, almost colourless (no. 724).
		Other fragments, almost colourless.
	Fabric 8.	Three beakers with thumb indents, greenish colourless.
	Fabric 9.	Three toilet-bottles, dark green.
25/237 G/B.	Fabric 1 or 3.	Bowl, moulded rim, greenish colourless (no. 172).
	Fabric 3.	Bowl, buff colourless.
		Lamp with wheel incisions, greenish.
	Fabric 4.	Two cups on stem, yellow.
	Fabric 5.	Bowl, green.
		Several lamps, yellowish green.
		Jug, yellowish brown.
	Fabric 6.	Oval dish, purplish colourless.
25/276 A/G.	Fabric 1.	Plate, almost colourless (no. 80).
	Fabric 2.	Bowl, almost colourless (no. 187).
		Two flasks, almost colourless.
	Fabric 3.	Oval dish, yellowish colourless.
		Bowl, greenish colourless with green rim coil.
		Flask, green.
		Two-handled flask, greenish colourless (no. 790).
	Fabric 4.	Cup on stem, green.
25/4009 A <sup>1</sup> /K.	Fabric 3?	Oval dish, greenish colourless (no. 32).
	Fabric 3.	Three lamps, greenish colourless with blue blobs.
		Jug, scratched decoration, yellowish colourless (no. 743).
		Fragment, greenish colourless with opaque white marvered-in festoons.
	Fabric 4.	Bowl, yellow with purple base.
	Fabric 5.	Lamp, yellowish green with blue blobs.
	Fabric 6.	Flask, dark purple with green base coil.
	Fabric 7.	Oval dish, blue with dark blue coil.
	Fabric 8?	Bowl, green with dark blue coil (no. 283).
24/4020 A/G.	Fabric 2.	Small flask, almost colourless.
	Fabric 4.	Cup on stem, yellow.
	Fabric 4 or 5.	Several bowls, green.
	Fabric 5.	Several lamps, yellow.
	Fabric 7.	Bowl, dark brown.
		Bowl, green (no. 258).
		Small fragment, dark blue.

The rooms chosen have been arranged, starting from the earliest, in the order of the dates given to each set of houses in the *Topographical Report*.<sup>1</sup> Those dates are as follows:

- (a) Houses B 1–B 25 (1926–7)—early second to early third century.
- (b) 5000 houses (1924–26)—mid-first to early third century.
- (c) c-period houses (1927–9)—early second to mid-third century.
- (d) Houses B 26–B 59 (1926–7)—late third to early fourth century.
- (e) B-period houses (1927–9)—mid-third to mid-fourth century.
- (f) 100 and 4000 houses (1924–6)—fourth and fifth century.
- (g) A-period houses (1926–9)—mid-fourth to mid-fifth century.

Some of these limits of date are disputable, notably the lower limits given to the 5000 houses and to the c-period houses, both of which should preferably read late second instead of mid-first and early second respectively, but for the rest they may be taken as a good working basis.

It should be remembered, in judging of the relative frequency of the fabrics at various epochs, that in general the commonest fabrics are nos. 2, 3, and 5; fabrics 1, 4, 8, and 9 are less common; fabric 6 is rare; and fabric 7 is very rare.

In (a) fabrics 1, 2, 8, and 9 are predominant, fabrics 3 to 7 being of very rare occurrence.

In (b) and (c) all fabrics occur in their proportionate frequency as stated above.

In (d) and (e) fabrics 1, 8, and 9 are rare,<sup>2</sup> fabric 2 is more frequent (specially in two of the rooms, B 27 A and B 127 C), fabrics 3 and 5 are very common (room B 50 B contains pieces of 5 alone), fabrics 4 and 6 only occur in B 167 E, and fabric 7 is absent altogether.<sup>3</sup>

In (f) and (g) fabrics 1, 8, and 9 are again very rare, fabric 2 is predominant in 130 C (note that 8 and 9 are common there too) but rare elsewhere, fabrics 3 to 5 are very common, and fabrics 6 and 7 occur as often as their general frequency on the Kōm warrants.

In short, two groups of fabrics may be distinguished, an early one and a late one. Nos. 1, 2, 8, and 9 are predominant in the earliest

<sup>1</sup> *Topographical Report*, pp. 5, 9, and 39.

<sup>2</sup> It should be mentioned, however, that in other rooms of this and the succeeding period one type of fabric 9 (the toilet-bottle, XIII E) is common enough; see p. 266 below.

<sup>3</sup> The rarity of 4, 6, and 7 in the selected rooms here is certainly fortuitous, for that these fabrics are wholly contemporary with 3 and 5 is indubitable.

period and become far more rare in the later rooms, with the single exception of 130 c of the latest period: nos. 3 to 7, on the other hand, are commonest in late rooms and hardly occur at all in the very earliest.

The change over from the early to the late group takes place during the period of occupation termed c period, (b) and (c) above. By the time that these houses were in use in their reconstructed state in the b period, (d) and (e) above, the later group, fabrics 3 to 7, is already predominant, though numerous survivals of the earlier group are found, owing, no doubt, to their careful preservation as heirlooms.

The absolute date, therefore, to be ascribed to this change over depends entirely on the date given to the 5000 and c-period houses. It has already been suggested that in the writer's opinion the limit of date given to them in the *Topographical Report* is too early. They cannot have been in existence much, if at all, before the year 200, and their central point is probably the first half of the third century. This opinion, which he feels constrained to put forward, though it runs contrary to the official dating adopted by the excavators, is based partly on general impressions of the stratification and of the architectural evidence formed while he was a member of the staff of the excavations in 1928-9, and partly on evidence of papyri and ostraca of the first four years' digging, kindly communicated to him by Mr. Leiv Amundsen. In the houses in question the large majority of papyri and ostraca were definitely of third- and not second-century date. The few second-century examples might easily be accounted for as survivals or safe-deposit documents. Unfortunately the third datable series of finds, the coins, has not yet been analysed and published, and their evidence is therefore not available, but it will be surprising if, when it appears, it does not confirm that of the papyri and ostraca.

Further, it must be remembered that the majority of the rooms in these c-period houses were used in the b period as well, and so, although the peak of the c period was from about 200 to 250, the rooms were usually in use until a much later date. This accords well with the fact that numerous papyri of about 300 were found in them. It seems, then, as if the manufacture of the fabrics in the early group, nos. 1, 2, 8, and 9 with the exception of the late type, XIII E, continued up to 200 and probably a little later, while the manufacture of the later fabrics, nos. 3 to 7, probably began during

the early part of the third century, though it may not have been in full swing until the later part of that century.<sup>1</sup>

The present excavations unfortunately give no indication of when the early group began to be in use. That they were the predominant second-century glass of Roman Egypt is proved by the finds in houses B 1-B 25. How much, if at all, they were current in the first century, is still to be determined.

Similarly, the Karanidian evidence is insufficient to provide an upper limit of date for the later group. There was little occupation at Karanis after 400, and there is no evidence of any after about 460. Fabrics 3 to 7 occur in great quantities in the latest houses on the Kôm. They therefore lasted from about 250 to at least 450; how much longer is still uncertain. Probably not very much longer, for by the sixth century new types and fabrics had sprung up which link up with the succeeding Arab period rather than with the Roman.<sup>2</sup>

It may be asked, Does the evidence from other sites in Egypt help toward a solution of these problems? The answer is, hardly ever. Very few finds of Roman glass from other Egyptian sites can be dated by their associations at all accurately, and any that can be so dated fall within the period covered by the present collection, and thus, though they confirm its evidence, they do not supplement it.

Some slight advantage might be gained by taking into consideration the evidence from other provinces. But the whole problem of the dating of Roman glassware bristles with so many difficulties that the discussion would of necessity outstrip reasonable limits. Two brief suggestions may, however, be worth recording.<sup>3</sup>

In the first place, judging from the finds in dated first-century deposits in the west, the principal glass, or at any rate export glass, made at Alexandria during the first century was the millefiori or monochrome mould-pressed ware; with perhaps, in addition, simple flasks, toilet-bottles, and wine-bottles of blown glass.<sup>4</sup> It does not appear that any of the types common in the second-century Karanidian houses, for example the colourless cut wares and the bowls

<sup>1</sup> A fuller discussion of the dating of individual types will be found in the appropriate place in the introductions to the various chapters.

<sup>2</sup> Compare Lamm, *Mittelalt. Gläser*, p. 34, pl. iii, for a series of undecorated glasses from Egypt belonging to the period from the fifth to the thirteenth centuries.

<sup>3</sup> A fuller discussion of these questions in regard to special types will be found in the appropriate place in the introductions to the various chapters.

<sup>4</sup> See pp. 39-40 below.

with moulded rims of fabric 1, occur in dated deposits in other provinces before the second century.

In the second place, though none of the Egyptian fourth-century products appears to have been exported at all, shapes parallel to the conical lamps, for example, and to the bowls with unworked rim and plain base, and to the jars with lattice decoration, occur in fourth- and perhaps fifth-century layers, but not very frequently, if at all, in the sixth century.

This suggests that the limits of date fixed on the strength of the Karanis evidence are reasonably correct, and that the early group of fabrics did not start before about 100, while the later group probably ended with the fifth century.

#### B. CIRCUMSTANCES OF FINDING, AND USE OF THE GLASS

Much of the glass in the Catalogue, including all the smaller fragments, was found loose in the filling of the occupation levels, but more than half of the complete pieces belong to groups or hoards, and it may be of interest to give a brief list of these and a description of their context, as far as it was recorded.

##### 25/209 C/B-V and 27/209 C/FL-NI

Twenty pieces of glass, B-V, were found in 1925-6 in a pot 'k' (type 369) buried beneath the floor of the room. Beneath the pot was a group of wooden objects—toy horses, castanets, and a pin. Six pieces of glass, FL-LI, were found in 1927-8 in pot 'l' (type 34), which was covered with a lid 'm' (type 25), again buried beneath the floor. MI and NI were found beside pot 'l,' covered with a piece of palm-fibre matting.

The glass includes:

- 2 oval dishes—17, 18
- 14 shallow bowls—90-9, 113-16
- 2 deep bowls—230, 231
- 1 lamp—449
- 1 cup on stem—482
- 3 jars—496, 498, 509
- 3 flasks—533, 536, 595
- 1 cylindrical jug—733
- 1 two-handled flask—784

All these twenty-eight vessels belonged to one of the three fabrics 3, 4, or 5; the majority to fabric 4, nos. 533 and 595 to fabric 3, nos. 536 and 784 to fabric 5, and no. 733 to fabric 4 or 5.

##### 25/239 A/K X 2

Two large shallow bowls both of fabric 3 were found in a wooden box 'j,' which also contained three dishes of polished red pottery 'm' (type 150) and 'n x 2' (type 220). In the same group was a stone mortar, 'i.'

## 25/293 A/A-J

Nine vessels were found in a pot 'a' high in the filling in the north-east corner of the room. In the group are:

- 2 lamps—450, 465
- 1 cup on stem—483
- 3 jars—493, 494, 508
- 1 flask—597
- 1 bottle-flask—690
- 1 two-handled flask—783

All are of fabric 4.

24/4029 G<sup>1</sup>/F-W

In room 4029 G<sup>1</sup> was found a group of six wooden boxes, 'A,' 'E,' 'K,' 'L,' 'P,' and 'S,' which contained the following objects:

- 'A' a wooden comb
- two spindle whorls
- 'E' a glass flask, 'F' (500, fabric 3)
- a glass deep bowl 'G' (237, fabric 3)
- a glass deep bowl 'H' (238, fabric 3 or 5)
- a glass deep bowl 'I' (250, fabric 3)
- a fragmentary glass lamp 'J' (not retained)
- 'K' a woven basket
- 'L' a bronze boss
- a bronze lamp
- a glass flask 'O' (596, fabric 4)
- 'P' two fragmentary glass lamps 'Q' and 'R' (not retained)
- 'S' a glass oval dish 'T' fragmentary (not retained)
- a glass deep bowl 'U' fragmentary (not retained)
- a glass deep bowl 'V' fragmentary (not retained)

Near the boxes was a flask 'W' of dark blue glass (548, fabric 7).

## 26/BC 61 D/B-F

Six glass vessels were found in a group in a window on the north wall of the room, along with a group of miscellaneous objects, 'G-Q,' comprising a spindle whorl, two weavers' combs of wood, two hair combs of wood, a stirring rod, a shell, a pottery lamp, a reed basket with lid, and a palm-leaf basket with lid. The glass was inside the palm-leaf basket 'J.'

The vessels were:

- 1 oval dish—19
- 1 shallow bowl—100
- 2 deep bowls—228, 229
- 1 jar—497
- 1 flask—535

All were of fabric 4.

## 27/B 121 K/D-H, K, N, O

Eight glass vessels were found in a large pithos 'a' (type 51) covered with a stone mortar 'A.' The flask 'G' had a leather cover 'J'; the kohl pot contained two bone pins 'L' and 'M'; and the lamp 'O' contained four dice 'P.'

The glass includes:

- 1 kohl pot—365, fabric 2

- 2 lamps—459, 460, fabric 5
- 4 flasks—537, 538, both fabric 3 and 601, 612, both fabric 5
- 1 cylindrical jug—739, fabric 5

**27/C 45 A/A-C**

Three glass vessels were found together 'near the west wall of c 45 J.'<sup>1</sup> They were:

- 1 deep bowl—329
- 2 lamps—455, 456

All were of fabric 5.<sup>2</sup>

**27/C 45 F/F, G**

Two glass goblets were found in a hole in the sill of the niche in the west wall of the room. With them was a small wooden box 'H,' and five date stones 'J.' The hole was covered by a pot lid 'a' (type 195), held in place by mud plastering 'K.' These goblets are nos. 408-9, both of fabric 2.

**27/C 50 A/M-O**

Three glass vessels were found just below the level of the lintel of the blocked doorway in the east wall. They belonged therefore to the B period of occupation. They comprise:

- 1 oval dish—7, fabric 3
- 1 lamp—457, fabric 5
- 1 flask—609, fabric 5

**27/C 56 G/LI-OI**

Four glass vessels were found with a group of miscellaneous objects in the southwest corner of the room. The group included sea-shells 'GI-KI,' a small cylindrical wooden box 'PI,' three pottery dishes (type 356), and a pot 'e' (cf. type 369) with a cover 'd' (type 150). The glasses, which were stored in pot 'e,' include:

- 2 shallow bowls—101, 102, fabric 4
- 1 lamp—436, fabric 3 or 8
- 1 two-handled flask—788, fabric 5

**28/B 158 A/F-H**

Three glass vessels were found in a niche in the west wall, at floor level. They comprise:

- 2 shallow bowls—83
- 1 flask—539

All were of fabric 3.

**28/C 42 F/A-L**

Eleven glass vessels were found in three separate deposits. A flask 'A' was leaning against the centre of the east wall. Eight vessels 'B-J' were in a pot 'h' standing on the floor near the south end of the east wall. And two vessels 'K-L' were in a large pithos 'j' sunk below floor level near the centre of the west wall. The pithos also contained two lamps and three small jugs, all of pottery. Also near the east wall

<sup>1</sup> This, which is quoted from the field inventory, does not seem to tally with Plan VI, section F 10 of the *Topographical Report*: there the two rooms A and J are nowhere contiguous.

<sup>2</sup> On the homogeneity of this group and its significance see p. 99.

was a wooden box containing a group of amulets, rings, beads, &c., of bone, glaze, glass, and bronze.

The glass comprises:

- 2 oval dishes—20, 21
- 3 shallow bowls—89, 103, 112
- 1 deep bowl—235
- 1 bowl on stem—355
- 2 lamps—451, 452
- 2 flasks—534, 594

All are of fabric 4 except the shallow bowl, 89 (fabric 3) and the flask, 534 (fabric 5).

28/C 42 J/AI

Twenty-six glass vessels were found in a cellar, J, of house c 42. Glasses 'A-P' were in a storage pithos 'c.' Glasses 'Q-Z' were in a second pithos 'd.' Two other pithoi 'a-b' near by contained a collection of pottery lamps, bronze bells, amulets, &c. Beside the pithoi, propped up against the wall, were two dishes of red polished pottery and the shallow glass bowl 'AI.'

The glass comprises:

- 6 oval dishes—15, 16, 22-5
- 6 shallow bowls—104, 108-11, 130
- 4 deep bowls—232-4, 236
- 1 bowl on stem—356
- 3 lamps—453, 454, 464
- 2 cups on stem—481, 485
- 2 jars—495, 511
- 2 jugs—720, 732

All are of fabric 4 except two oval dishes, 15 and 16 (fabric 3), and a shallow bowl, 130 (fabric 4 or 5).

It will be seen from the above synopsis that it was a common practice to store the glass in baskets, wooden boxes, or large pottery pithoi. The baskets and wooden boxes were laid on the floor or on a convenient ledge, the pithoi either stood on the floor or were sunk into it.

Among the larger hoards, i.e. those of 209 C, 293 A, 4029 G<sup>1</sup>, BC 61 D, B 121 K, C 42 F, and C 42 J, the predominant fabric is no. 4 and there is only one single specimen of glass (the kohl pot, B 121 K/K, fabric 2) that does not belong to one of the three table wares, fabric 3, 4, or 5. These hoards are almost entirely composed of dishes, bowls, jars, flasks, and jugs such as are suitable for use as part of a dinner service, and, along with the glass, examples of red-polished pottery dishes occurred more than once. Together these represent the best table ware of the well-to-do Karanidian resident of the fourth century.

Such a usage, indeed, accounts for the largest proportion of the glass from the later levels at Karanis, but it does not seem as if in the earlier period, represented by finds in houses B 1-25, glass was

so used in any great quantity. Bowls and beakers of fabrics 1 and 2 occur, but they, or rather their fragments, are rare in comparison to the numbers of glass fragments found in the later levels. Similarly the use of glass for lamps does not seem to have grown up until the middle of the third century at the earliest; this, indeed, accords with the evidence from other provinces where glass lamps are hardly known before the fourth century.<sup>1</sup> On the other hand, the use of glass for toilet and storage is more prevalent in second-century houses than in later ones. Tiny flasks of fabrics 2 and 8, and dark green toilet-bottles of fabric 9 are more plentiful in these earlier houses, and so, too, are the dark green rectangular bottles of fabric 9 that were used for both the transport and the storage of wine and oil.

Glass objects, apart from beads, which are omitted from this study, are rare throughout the period. Especially is this noteworthy in the case of inlay: in dynastic and Ptolemaic times the art of inlay was in full bloom; to judge from finds at Karanis it became very rare under the Roman Empire.

#### C. HISTORICAL SIGNIFICANCE OF THE MATERIAL

It remains to sum up briefly the general bearing of the material included in the Catalogue on the history of glassware under the Roman Empire, not only in Egypt, but also in other provinces.

That the glassware in use at Karanis during the period covered by this collection is typical of what was in use throughout Egypt during the same period will be manifest on consideration of the evidence adduced in the introductory matter at the head of each chapter. The only difference between Karanis and other sites, even neighbouring ones in the Fayûm, seems to be that, by a fortunate circumstance, Karanis has proved to be richer in glass than any other single site. This may be seen by a comparison of the quantity of glass produced by any one year's campaign at Karanis with that produced during a similar period by digging at Hawara,<sup>2</sup> and Ehnasya,<sup>3</sup> to take two sites where Roman houses have been excavated and published.<sup>4</sup> And further proof, if any is needed, is furnished by the

<sup>1</sup> Crowfoot and Harden, pp. 200 ff.

<sup>2</sup> Petrie, *Hawara*, pp. 11-12.

<sup>3</sup> *Id.*, *Ehnasya* and *Roman Ehnasya*, Egypt Exploration Fund Memoir, no. xxvi, and Supplement.

<sup>4</sup> It is true that the publications of these digs are by no means as full as the present publication, and they ignore fragments almost entirely. But the average number of complete pieces found at Karanis in any one year is about forty, whereas from Hawara only seventeen are published (mostly small flasks from tombs) and from Ehnasya none at all are published though a few pieces were found.

Cairo Museum accession lists, in which since about 1900 far more than half the glass of which the find-spot is known comes from Karanis.

The explanation of this fact which first suggests itself is that Karanis was a centre of fabrication of glass. It must be admitted at once that so far no real proof of this exists, for the two doubtful fragments of unworked glass listed as numbers 997 and 998 in the Catalogue are scarcely sufficient to warrant such a sweeping assumption. All that can be said is that they belong seemingly to fabric 4, and therefore, if their evidence can carry any weight, it suggests that the most likely of all the fabrics to have been made locally is that fabric. On the other hand, pieces of fabric 4 have been found in Egypt as far south as Armant<sup>1</sup> and Edfu,<sup>2</sup> and all the other eight fabrics also occur in all parts of Egypt. Failing, therefore, incontrovertible evidence of a local Karanidian glass-industry—remains of a glass-furnace, for instance—it must be assumed that the glass found at Karanis comes from Alexandria, the one place in Egypt where glass is known to have been made; and so it may be taken that the finds at Karanis provide some indication of the sequence of types and fabrics that emanated from the Alexandrian glass-works between the second and the fifth century.

Most unfortunately, Karanis has yet produced nothing of an earlier date than about the year 100, so that nothing is known as to the types and fabrics current in the Augustan and Claudian periods. This was a time of vital importance for the history of glass, for it was then that the industry was undergoing the revolutionary change from the processes of modelling and mould-pressing to that of blowing. Were a large group of finds of first-century glass forthcoming for study, it might be that they would afford just the evidence needed to prove the exact time at which the glass-blowing process was invented. But such a group is still to seek. Present evidence from other sources than Karanis is only enough to suggest that the first blown glass—simple forms of drop-shaped toilet-bottles and dark green mould-blown bottles—began to be made about the Christian era, but that blown glass was not common in any quantity<sup>3</sup> before the first half of

<sup>1</sup> There are several fragments in Oxford, no. 1933. 1142, from E.E.S. excavations.

<sup>2</sup> A hoard containing numerous examples of this fabric was found in a jar at Edfu in 1885 and is now in Brooklyn (Wilbour collection); see p. 96 below.

<sup>3</sup> It was commoner in Syria than in Egypt in the earliest period (compare, e.g., finds of typical Syrian products in first-century tombs in Cyprus), and this suggests that the blowing of glass was an invention of Syrian rather than of Alexandrian workers.

the first century. The glass made at Alexandria during that century was in part mould-blown and in part modelled and mould-pressed, the latter two processes including most, if not all, of the millefiori and monochrome bowls of pillar-moulded and cognate types, such as were exported from Alexandria as far west as Britain.

By the second century evidence from Karanis comes to our aid. It shows us the Alexandrian workshops still producing a quantity of mould-pressed and polished bowls (those of fabric 1), but also producing numerous bowls, beakers, and flasks of plain-blown, colourless glass of fine texture (fabric 2), and cheap green glass also, chiefly toilet-bottles (fabrics 8 and 9). Millefiori and fine monochrome wares are so rare that it looks as if they had already ceased to be manufactured, such as do occur being heirlooms. Most of this second-century glass may be described as luxury ware; that so much is found at Karanis, albeit in a broken state, is a tribute to the prosperity and relatively high state of civilization of the inhabitants of Karanis of the period.

During the third century new types and fabrics occur. The colourless glass of fabric 2 gives place to coloured glass of poorer quality and more careless workmanship (fabrics 3 to 7); but these coloured wares soon become far more common than fabric 2 ever was. In other words the third century sees the beginning of mass production of cheap glass for the table and other uses.<sup>1</sup>

The shapes and fabrics that arose during the third century continue practically unchanged, save in minor details, and in a steady coarsening of technique and decoration, until the Karanis evidence comes to an end in the fifth century. The height of the popularity of this later group of fabrics centres round the year 300, as is suggested by the large hoards of it found in deposits of about that date.<sup>2</sup> It may, indeed, have been a little later, if an important piece of historical

<sup>1</sup> See Rostovtzeff, *Social and Economic History of the Roman Empire*, p. 166, for the same process occurring in other industries of the period. An interesting illustration of the cheapness of glass in Egypt under Diocletian (285-305) is furnished by a story from the *Acta Martyrum* quoted by J. Rendel Harris in *Bull. John Rylands Library* (Manchester), II, 2 (1927), 293. The original text of the story may be found in *Corp. Script. Christ. Orient., Script. Coptici*, Ser. 3, i, *Acta Martyrum*, Coptic text, p. 128, Latin trans., p. 82 (ed. I. Balestri and H. Hyvernat, Paris, 1908). A certain Apa Epime (Epimachus), head man of Pancleus in the Pemge (Oxyrhynchus) nome, was haled before a judge during the Diocletianic persecutions and told to produce the elders and deacons and altar vessels belonging to his village. He complained in answer that these vessels were of glass because they were poor men 'Vasa quibus communicamur sunt vitrea, nam nos pauperes sumus in parvo ἐπιγειον (=Gk. ἐποίκιον) degentes.'

<sup>2</sup> Pp. 34 ff. above.

evidence is to be taken as a guide. A tax on glass-workers was imposed by Alexander Severus (222–35),<sup>1</sup> reimposed by Aurelian (270–5)<sup>2</sup>—at least on glass imported into Rome—and remitted by Constantine (306–37).<sup>3</sup> It is likely that this remission of tax by Constantine had a hand in fostering the glass-industry about the turn of the third and fourth centuries.

Turning to the other provinces of the Empire, it is impossible here to do more than touch lightly on the problems involved. The connexions of the Romano-Egyptian glass-factories with those of Syria on the one hand and those of Italy and the western provinces on the other, are intimately bound up with the whole history of glass-ware at the time, and a full elucidation of them would demand a much more detailed presentation of the types and fabrics from other parts of the Roman world than is in place in this book. It is possible, however, bearing in mind the evidence of identity or parallelism in certain types and fabrics adduced in the introductions to the chapters, and taking into consideration also the statements of ancient authors, to make a few general observations and to throw out pointers which may at least help toward a proper assessment of the influence of the Egyptian workers on their contemporaries in other provinces.

As regards Syria such an assessment is rendered the more difficult by the lack of any adequately dated series of Syrian material, published or unpublished. Finds of glass are as common in Syria as they are in any other province, and Syrian vessels exist in their hundreds in every large museum, but most of them come from illicit digging, and external evidence of date is usually non-existent. And, what is worse, such publications as do exist, with one exception, that of the de Clercq collection by de Ridder,<sup>4</sup> are either antiquated or so scrappy as to be useless.

As regards the western provinces the position is much better. The Gallic material has been dealt with in the most exemplary manner by M. Morin-Jean,<sup>5</sup> and the Rhenish material has been

<sup>1</sup> Lampridius, *Life of Alexander Severus*, 24, 5: 'vitrariorum, . . . aurificum et ceterarum artium vectigal pulcherrimum instituit,' quoted by Kisa, p. 184, and Trowbridge, *Philol. Studies*, p. 118.

<sup>2</sup> Vopiscus, *Life of Aurelian*, 45, 1: 'vectigal ex Aegypto urbi Romae Aurelianus vitri, chartae, lini, stupuae atque anabolicas species aeternas constituit,' quoted by Kisa, p. 186, and Trowbridge, *ibid.*, p. 119.

<sup>3</sup> *Codex Theod.* 13, 4, 2: 'artifices artium (including amongst numerous others vitrearii) ab universis muneribus vacare praecipimus'; in *Codex Iust.* 10, 66 (64), 1, the same statement is made; see Kisa, p. 184, and Trowbridge, *l.c.*

<sup>4</sup> De Ridder, *Cat. de la collection de Clercq*, VI, 'Les Terres cuites et les verres.'

<sup>5</sup> Morin-Jean, *La Verrerie en Gaule sous l'empire romain*.

published very fully, not only in Kisa's general work on ancient glass<sup>1</sup> but also in numerous monographs on special finds in the pages of such periodicals as the *Bonner Jahrbücher* and the *Mainzer Zeitschrift*. An adequate publication of Italian material is still wanting. Until this last and the Syrian material have been made thoroughly accessible, no general work on Roman glass can attain completeness.

From the earliest known times there has always been a close social and commercial connexion between Lower Egypt and the Syrian coast. Communication by both land and sea is short and easy. It is natural, then, that in Roman times, when both countries were under the same government, the industries of each country, and among them glass-working, should have been quick to borrow new techniques and ideas from the other. It is unfortunate that neither the Karanidian material, nor any published results from elsewhere in Egypt, give accurate information as to what glass was current in Egypt in the first century of the Empire, for this lack would make it impossible, even if Syrian evidence were available, to estimate the relative importance of the Syrian and Alexandrian workshops for the origin and earliest history of blown glass. Such indications as are available suggest that far more blown glass was made in Syria than in Egypt during the first century; the toilet-bottles found in tombs of early imperial date in Cyprus are undoubtedly of Syrian fabric; and the mould-blown vases of Ennion, which may be of the early first century A.D.,<sup>2</sup> are prior to any blown glass as yet known from Egypt. It seems, therefore, as if the blowing of glass owed its origin and early development to Syrian workers.

Between the second century and the fifth the Karanidian material not only helps, in the absence of any dating evidence from Syria itself, to give a date to certain well-known Syrian types, but also shows, when compared with that of Syria, how very closely interrelated were the industries of the two provinces. Bowls like nos. 328 ff. and lamps of the conical type with unworked rim like nos. 436 ff. were made in both provinces in almost identical shapes and fabrics, even to the decoration of wheel cuts or incisions and blue blobs. Thumb-indent beakers (type as nos. 391 ff.) with or without tubular base rings, jars with a lattice between rim and shoulder (type as nos. 493 ff.),

<sup>1</sup> A. Kisa, *Das Glas im Altertume*, 3 vols. The work is posthumous, and the editing, which was careless, has made the book very difficult to use, but the information is generally accurate and repays the most careful study, especially in regard to the western material.

<sup>2</sup> Harden, *Journ. Roman Studies*, xxv (1935), 182.

flasks with a constriction at the base of the neck (type as nos. 516 ff.), jugs with an ovoid body and a pad base (type as no. 712), oil-flasks (type as nos. 767 ff.), and a whole host of other types are so similar in each province that it cannot but be true that a constant coming and going of technical workers existed throughout the period in question.

How much actual importation of finished products from the one province to the other occurred is not so certain. Two fragmentary bottles have turned up at Karanis, nos. 759 and 763, which seem from their fabric to be of Syrian origin. If Syrian, they were imported for their contents and not for their own sake. In Cairo there are numerous pieces of Syrian glass, but there is none which comes from a definite Egyptian find-spot, and every one of them might be a modern and not an ancient import; and the same is true of numerous pieces of undoubtedly Syrian glass in other collections that have been bought in Egypt. As regards glass of Egyptian workmanship from Syrian sites, only a few toilet-bottles have been noticed, though a search in Syrian museums might well bring other types to light. In short, even if there was a certain amount of cross traffic in finished products from one country to the other, it was chiefly, if not entirely, due to the importation of liquids and unguents in glass containers rather than to the importation of glass vessels for their own sake.

When connexions between Egypt and the west come up for consideration, the problem is often complicated by doubts whether these were due to direct influence or to influence via Syria, for it must not be forgotten that there was in Roman and later times a considerable direct trade-connexion between Syria and the west.

Much of the influence must therefore be termed a general eastern one, without specifying whether it came from Egypt or Syria. Of this type is the evidence to be deduced from the Greek inscriptions and the signatures of Greeks on glass vessels made in the west, proving not only the presence of people of eastern descent, but the presence of people who were so recently come from the east that they still spoke Greek. For a Greek inscription or signature is not enough to prove that a vase is actually eastern in fabric. Some of the finest cut bowls with Greek mythological scenes in which the characters are designated by names in Greek are undoubtedly so;<sup>1</sup> but numerous other vases with Greek inscriptions occur which are less directly eastern in origin.<sup>2</sup>

<sup>1</sup> See p. 101 below.

<sup>2</sup> See Kisa, pp. 199 and 629, notes.

Further, both Kisa<sup>1</sup> and Morin-Jean<sup>2</sup> speak of a continuous influx of eastern workers coming to Gaul and the Rhineland during the imperial period. These were not specifically glass-workers, but it would be strange, having in mind the fame and importance of the Syrian and Egyptian glass-makers, if such were not among their number. And there is, moreover, the archaeological evidence of the gradual infiltration of types and decorations that undoubtedly had their origin in the east, even though there may be doubts whether they emanated first from Syria or Egypt. Among types, for instance, may be mentioned the thumb-indent beaker, the conical lamp, and the oil-flask; and among decorations, cutting, scratching, and blue blobs.

When we come to look for Egyptian, as distinct from general eastern, connexions with the west, the evidence is entirely archaeological. There is, it is true, some literary and inscriptional proof that Egyptian craftsmen were settled in Gaul and the Rhineland, but there is no particular reason to connect these craftsmen with the glass-industry.<sup>3</sup>

The occasional examples of dark green cylindrical and rectangular bottles and variegated toilet-bottles of Alexandrian type and fabric that occur in the west denote not so much a trade in glass as a trade in the commodities they contained.

Direct trade in glassware is, however, proved by the fact that, as a reference to the several chapters of the Catalogue will show, quite a number of types found at Karanis are not only similar to but are identical with well-known western shapes. What is more, in each case the actual fabric of the Karanidian and western examples is the same. We must therefore postulate a common place of manufacture for each set of parallels, and that the place was always Alexandria and not a western site is more than probable. Export of glass from east to west is attested by ancient authors;<sup>4</sup> export in the contrary direction is attested by none.<sup>5</sup> The fact that more complete pieces of the several types are known from western than from eastern sites is not to be admitted as evidence for western fabrication, for such finds are not proportionately greater in the west in comparison with the quantity of glass discovered.

<sup>1</sup> Kisa, pp. 15 and 277.

<sup>2</sup> Morin-Jean, pp. 242, 387, and 391 ff.

<sup>3</sup> See Kisa, pp. 194 ff., and 241-2.

<sup>4</sup> See, e.g., Cic. *Pro Rabirio Post.* 14, 40 and Vopiscus, *Aurelian*, 45, 1 (quoted, p. 41). On trade in glass see Trowbridge, *Philol. Studies*, pp. 134 ff.

<sup>5</sup> Kisa, p. 388, states that Cologne glassware was imported into the Orient, but gives no instances.

The following is a list of the more important instances of these parallelisms:

1. Oval dishes with moulded rims, fabric 1 (p. 48).
2. Oval dish with folded rim, fabric 3 (p. 49).
3. Circular plates with moulded rims, fabric 1, millefiori and fine wares (p. 50).
4. Shallow bowl on base ring, fabric 3 (p. 65, and p. 71, note 2).
5. Shallow bowls with moulded rim, fabric 1 and millefiori (p. 66).
6. Shallow bowls with rounded base, cut decoration, fabric 2 (p. 68).
7. Deep bowls with rounded base, cut decoration, fabric 2 (p. 101).
8. Beaker, plain, fabric 3 (p. 136, note 12).
9. Goblets on pad base, cut decoration, fabric 2 (p. 139).
10. Goblets with relief-festoons, fabric 2 (pp. 139-40).
11. Goblets with rounded base, cut decoration, fabric 2 (p. 141).
12. 'Snake-thread' ware, polychrome and monochrome, fabric 2 (p. 169).
13. Inverted-piriform flasks, early ware (no Karanis examples) (p. 190).
14. Cylindrical bottles and jugs with scratched decoration, fabric 3 (pp. 236 and 257).

It will be noticed that all these varieties belong to an early fabric (usually fabric 1 or 2) except nos. 2, 4, 8, and 14; and of these exceptions the western examples of the first three are isolated specimens from a single grave-group found at Köln-Müngersdorf.<sup>1</sup> The inference is obvious. During the first and second centuries there was a regular import trade of fine glassware from Alexandria into the western provinces of the Empire; not only, be it noted, to the central countries, Italy, south Gaul, and the Rhineland, but even to Britain.<sup>2</sup> In later times actual imports of glass hardly occur, and a regular trade seems only proven for one important type, the cylindrical jugs and bottles with scratched decoration. The Köln-

<sup>1</sup> Fremersdorf, *Der römische Gutshof Köln-Müngersdorf (Römisch-germanische Forschungen, Bd. 6)*, pp. 94-5, pl. 51 (coffin C); see pp. 49, 65, 71, and 136 below.

<sup>2</sup> See, e.g., pp. 49-50 and 66 below. Search in Spanish museums would surely reveal similar imports to the Iberian peninsula.

Müngersdorf find of pieces of fabric 3 may well have been carried to the west by a migrating family.

So much for direct imports. The evidence of intercourse between Alexandrian workshops and their western counterparts is harder to assay. Numerous examples of parallelisms in shape and decoration between Karanidian and western glass are quoted in the text, but, as is mentioned above, these may have passed to the west via Syria and not direct. It may be assumed, however, that some at least of them did come direct. What should be noticed is that such importations of shapes and techniques never ceased even in the fourth century. In other words, after direct trade in glassware had almost ceased, and at a time when western factories were capable of producing both ordinary and luxury ware in sufficient quantities to supply the whole western market, these factories still depended for ideas, and to some extent probably even for their personnel, on their eastern contemporaries. The eastern glass-works retained to the end of the Roman period, at least in part, that ascendancy in glass production which was so marked a feature of their earlier days.

The most important result of this ascendancy of the east was to ensure the common character of the glass-industry throughout the Empire. The constant flow of ideas from east to west, when combined with regular changes in fashion, caused new techniques and shapes to arise everywhere almost simultaneously. This is what makes it so hard at times to estimate the value of the contribution of each group of factories to the development of the industry as a whole. Further and more careful research, especially in Syria and Italy, will help greatly in elucidating the problems of that development; but it is more than doubtful if a complete unravelling of the tangled threads will ever be accomplished.

## CLASS I DISHES AND PLATES

THIS class comprises all table utensils which are too flat to be called bowls. The Karanis examples fall into two distinct groups:

- A. Those that are oval in horizontal section;
- B. Those that are circular in horizontal section.

The term 'dish' will be used for the oval vessels of group A, and the term 'plate' for the circular vessels of group B.

The dishes are very uniform. All have base rings and outsplayed sides, more or less straight in contour. They have been subdivided primarily according to rim technique and secondarily according to base technique.

The type is a late one. It was introduced during the late third century and had attained its full popularity by the early fourth. The extent of the popularity which it enjoyed during the fourth and fifth centuries is manifested by the countless fragments found in almost every house of the Constantinian and later periods at Karanis. It is not found in layers of the early third century.

The great majority of the pieces belong to fabric 3, 4, or 5, though there are a few fragmentary ones (notably some in subdivisions iii and iv) which are of fabric 1 or 2. These few fragments are earlier in date than the rest.

Examples of these dishes from Egypt are very common. Six are in the Askren collection,<sup>1</sup> Edgar lists thirteen,<sup>2</sup> Wainwright three,<sup>3</sup> and six pieces found at Karanis in 1919 are also in Cairo.<sup>4</sup> Among other specimens may be mentioned two in the British Museum (both from the Fayûm, bought in 1891), one in the Victoria and Albert Museum (no. 554. 1891), four in the Metropolitan Museum (Egyptian Department, nos. 43-6), two in Boston (nos. 13. 4289-90), one in Toronto (no. G 1812), and one in the Coptic Section of the Kaiser Friedrich Museum.<sup>5</sup>

But besides these oval dishes of the late period there is a fragmentary specimen from Egypt in the Petrie collection in University

<sup>1</sup> Mich. 5002-7; see App., p. 318.      <sup>2</sup> Edgar, *Cat.*, nos. 32408-19 and 32749.

<sup>3</sup> Wainwright, type 10, nos. J 47092 h, i, and 47105 l, p. 84 and pl. xxxvii.

<sup>4</sup> Nos. J 46469-74, all from one hoard; see App., pp. 310-11.

<sup>5</sup> Wulff, no. 1206, pl. lviii.

College, London, which belongs to a much earlier period. It is deep green in colour and has a moulded rim and a base ring, and is of exactly the same shape as the shallow bowls with moulded rim, nos. 169 ff., except that it is oval and not circular. The fabric is a well-known early Imperial one, and is the same as that of the circular plate, Bonn no. 1717 (p. 50). This piece is important, for it not only provides an Egyptian prototype for the later and commoner variety, but also provides a contemporary Egyptian parallel to the dishes with handle-plates found in other provinces (see below).

Though common in Egypt, the oval dish is quite rare outside that country.

An important second-century type is represented by nos. 760 and 933 (Fig. 1, a) in Cologne, found locally, both of colourless glass, and by a third example which is in the Museum at Zara, Dalmatia.<sup>1</sup> They have moulded rims with handle-plates jutting out from the rim at the major axis, and they stand on a base ring. The vertical section is, in fact, exactly the same as that of the colourless shallow bowls, nos. 169 ff. It is obviously based on a metal original, and metal examples have actually been found. Like the glass-workers, the *terra-sigillata* potters adapted this metal form to their own uses.<sup>2</sup> The example from the Petrie collection (see above) shows that oval dishes were made in Egypt during the first and second centuries, and it is not impossible, since their fabric seems Egyptian, that this group should be ascribed to Alexandrian workshops.

To a later date belongs an oval dish preserved in the Vom Rath collection in the Antiquarium, Berlin (no. 30220. 163). It is of rather poor, colourless glass, with a rounded rim, outsplayed sides, and a base ring, and is thus parallel to type A iii. A fragment of another dish has been recently published by Behrens. It comes from Alzei in Rhein-Hesse and bears a fragmentary inscription in scratched technique FELI . . . . (M)ULTIS ANNIS.<sup>3</sup> No. 7681 in Bonn is again similar, but of green glass, and no. 1722 in the same museum is a coil-rim bowl of greenish colourless glass with similar coil. No. 869 in Cologne (Fig. 1, e) is a roughly made, asymmetrical dish of green glass with a pushed-in base, angular sides, and rounded rim. It was

<sup>1</sup> No. 1294; see P. Marconi, 'Vetri romani nel Museo di Zara,' *Bollettino d'Arte*, xxvi (1932), 33 ff., fig. 2.

<sup>2</sup> Morin-Jean, p. 131, n. 1, figs. 172 (metal) and 173 (glass). To the references there add Oswald and Pryce, *Terra Sigillata*, p. 198, pl. lvii, 1.

<sup>3</sup> G. Behrens, 'Röm. Gläs. aus Rheinhessen,' *Mainz. Zeitschr.*, xx-xxi (1925-6), 62-77, fig. 22.

found in a grave with coins of Postumus, so that it is probably not later than the end of the third century. A very similar piece was found at Silchester and is now in Reading, and yet another is published by Cesnola from Cyprus.<sup>1</sup>

All these coloured examples show deviations from the recognized Egyptian type, and, except for the Cypriote example, are probably of western fabric. There is one oval dish, however, in Cologne (no. 26. 974, Fig. 1, d), of greenish glass, which is probably Egyptian. The rim is folded outward, the sides are outsplayed and almost straight, and the base ring is a true ring with post technique and faint modelling marks. It is therefore identical in all respects with nos. 1 ff. It was found in 1926 at Köln-Müngersdorf in a sarcophagus-interment dated about 370 by the finders.<sup>2</sup> If, as is almost certain, it was imported from Egypt, it is interesting evidence of interprovincial trade at the latest period of Roman domination.

The circular plates of group B are neither so homogeneous nor so common as the oval dishes. Some of the types are represented merely by fragments of rims, and therefore do not permit of a complete restoration. Even those types that can be completely restored are few and fragmentary.

The type is an early one, for all the specimens belong either to fabric 1 or 2. The circular plate seems to have gone out of fashion after the third century, if not after the second; it was then ousted by the oval dishes of group A and the shallow bowls of class II A i and ii. It was not even popular in the early Imperial period if the number of fragments hitherto found at Karanis is any criterion.

No exact parallels to either type i or type ii can be quoted from other sites in Egypt, though there is an example of yellowish opaque glass with a slightly different rim contour from Dimê in the Fayûm. This is now in the Egyptian Museum, Berlin.<sup>3</sup>

Both types are, however, found in Italy and the west. Of the first there is a colourless example of uncertain provenance in the Victoria and Albert Museum (no. 1040. 1868) and a fragmentary

<sup>1</sup> Cesnola, *Salaminia*, pl. xviii, 1 and 3.

<sup>2</sup> Fremersdorf, *Röm. Gläser*, pp. 11-12; *id.*, *Der römische Gutshof Köln-Müngersdorf (Römischi-germanische Forschungen*, Bd. 6), p. 94 f., pl. 51, 13. Two other glasses in this grave may be Egyptian also; see pp. 65, 71, and 136 below.

<sup>3</sup> No. 19728, from the Berlin Excavations, 1909. The rim on this piece is like that of type ii, without overhang, but it is divided from the upward curve of the bottom by a moulding which is convex on the exterior. An exactly similar rim appears on a plate found in northern Italy; see next page.

one of blue glass (A 22557) found in King William Street, London, is now in the London Museum. Another specimen of colourless glass has recently been found at Richborough<sup>1</sup> and no. 29496 in St. Germain, from Nérès, Allier, is a colourless rim fragment with cut notches, alternately long and short, around the edge of the rim. Of the second type there are two in the British Museum. One, from Nervi, near Bordighera, is of colourless glass, and the other, of uncertain provenance, is made of the common green millefiori glass with yellow circlets.<sup>2</sup> On the latter the upper surface of the rim is flat and not concave, and there are two cut circles, one at its inner edge and one at its outer. In Wiesbaden there is a colourless specimen (no. 2594), and an interesting bronze platter of identical contour in Cologne suggests that this shape, like its counterpart, the oval dish with handle-plates, was copied from metal-work.<sup>3</sup> Very similar plates, but with slightly different rim contours, may be quoted from Wiesbaden (no. 2593), of colourless glass, and from Bonn (no. 1717), of deep green glass. Another example, of green opaque glass, from northern Italy, in the British Museum (bought in 1910), has a rim just like that of the Dimê fragment above.

All of these were almost certainly made in Egypt. The colourless pieces are so nearly akin in fabric and texture to the Karanis specimens that they must have come from the same workshops, and the coloured specimens can hardly be separated from them.

Circular plates of other types are rare, both in Egypt and elsewhere. Among Egyptian finds there is one of colourless glass in Cairo (Fig. 1, b),<sup>4</sup> on which the contour of the rim is so similar to that of our fragment no. 81 that it may be used to restore its complete shape. A second type, very similar, is in the Askren collection.<sup>5</sup> Another, of green glass, fabric 4, is in Toronto.<sup>6</sup>

Outside Egypt various types are known. A colourless example with coil rim and pushed-in base ring is in the Antiquarium, Berlin,

<sup>1</sup> Bushe-Fox, *Excavations at Richborough*, ii, 52, no. 77, pl. xxv.

<sup>2</sup> Type of nos. 198 ff., class II.

<sup>3</sup> Here again very similar types were made by the *terra-sigillata* potters; see Oswald and Pryce, *Terra Sigillata*, pp. 202 and 208, pls. lx, 4 and lxvi, 1.

<sup>4</sup> No. J 47078, from Karanis; see App., p. 311.

<sup>5</sup> Mich. 5001; see App., p. 318.

<sup>6</sup> No. G 1913, from the Fayûm:

Green; intact; no weathering.

D. 0.197 m.

Rounded rim; sides slope gently downward to base ring. True base ring, tall and slightly outsplayed, with post technique and slanting impressions outside.

Fabric 4.

and one with folded rim and pushed-in base ring, of colourless glass, is in Bonn.<sup>1</sup> A similar type, fairly common on Gallic sites, is illustrated by Morin-Jean.<sup>2</sup> To this last type belongs Cologne no. 736, of green glass.

But the circular plate is always rare, and this whole class of dishes and plates, apart from the sudden popularity which the oval variety acquired from the late third century onward in Egypt, seems never to have caught the fancy of the Romans.<sup>3</sup> It is perhaps specially curious that neither the circular nor the oval type is found on Syrian sites, for the glass-industries of Syria and Egypt had strong interactions, even in the later Roman period.

#### SKELETON CLASSIFICATION

- A. Oval dishes on base ring
  - I. Folded rim, outward
    - (a) Base ring with post technique
      - 1. True base ring
      - 2. Pad base
    - (b) Base ring with pontil technique—all pad bases
  - II. Folded rim, inward
  - III. Rounded rim
  - IV. Coil rim
    - (a) Monochrome
      - 1. Greenish colourless
      - 2. Light green
      - 3. Light olive green
      - 4. Brown
      - 5. Purple
    - (b) Bichrome
      - 1. Colourless with dark green coils
      - 2. Colourless with blue coils
      - 3. Pale green with dark green coils
      - 4. Pale green with blue coils
      - 5. Green with light green coils
      - 6. Green with dark green coils
      - 7. Green with dark greenish blue coils
      - 8. Yellowish green with lighter green coils
      - 9. Yellow with light green coils
      - 10. Brown with dark green coils
      - 11. Purple or purplish colourless with light coils
- B. Circular plates on base ring
  - I. Broad, moulded lip with overhang
  - II. Broad, moulded lip without overhang
  - III. Miscellaneous rim fragments

<sup>1</sup> No. 1170, from a grave of about 200-10.

<sup>2</sup> Morin-Jean, p. 130, fig. 171.

<sup>3</sup> It will be recalled that in pottery also (e.g., in *terra-sigillata* ware) the flat dish is comparatively rare in Roman times.

## A. OVAL DISHES ON BASE RING

## I. FOLDED RIM, OUTWARD

## (a) BASE RING WITH POST TECHNIQUE

1. *True base ring*

Numerous examples, complete and fragmentary, and also many single fragments were found.

1. 24/113 I/A<sup>1</sup> Mich. 5502. PLS. I and XI  
 Yellowish colourless; intact; no weathering; bubbly glass with few impurities; faint traces of blowing spirals.  
 H. 0.051 m. Maj. Ax. 0.258 m. Min. Ax. 0.187 m. A.T. 0.001 m.  
 Hollow rim folded outward and downward. Sides straight outsplayed. Base slightly concave. True base ring with slanting impressions and post technique.  
 Fabric 3.

2. 24/113 I/A<sup>2</sup> Mich. 5684.  
 Greenish; in fragments; no weathering; bubbly glass with impurities; blowing spirals.  
 H. 0.055 m. Maj. Ax. 0.245 m. Min. Ax. 0.175 m. A.T. 0.0015 m.  
 Like no. 1 but more concave base and criss-cross slanting impressions.  
 Fabric 3.

3. 24/113 I/B<sup>1</sup> Mich. 5503.  
 Yellowish colourless; in fragments; no weathering.  
 Dimensions roughly as no. 2. Shape as no. 2.  
 Fabric 3.

4. 24/113 I/B<sup>2</sup> Mich. 5504.  
 Greenish colourless; in fragments; traces of frosting on one side.  
 Shape as no. 2, but slightly smaller.  
 Fabric 3.

5. 25/120 C/R<sup>1</sup> Mich. 5505.  
 Dark olive green; intact; no weathering; full of small pin-prick bubbles; no impurities; blowing spirals noticeable.  
 H. 0.053 m. Maj. Ax. 0.234 m. Min. Ax. 0.147 m. A.T. 0.002 m.  
 Rim as no. 1. Concave sides rising more steeply. Low base ring and no slanting impressions. Very uneven shape.  
 Fabric 5.

6. 25/120 C/R<sup>2</sup> Mich. 5506.  
 Dark green with yellowish and bluish streaks; small crack on side; no weathering; bubbles as no. 5 but more impurities; blowing spirals very noticeable.  
 H. varies c. 0.05 m. Maj. Ax. 0.215 m. Min. Ax. 0.154 m. A.T. 0.0017 m.  
 Straight outsplayed sides and higher base ring but otherwise like no. 5.  
 Fabric 5.

7. 27/C 50 A/O Mich. 5901.  
 Greenish colourless; intact; usage stains on outside, incipient frosty weathering on inside; not very bubbly, but full of black impurities.

H. varies c. 0.05 m. Maj. Ax. 0.228 m. Min. Ax. 0.153 m. A.T. 0.0015 m.  
Sides very slightly concave, otherwise shape as no. 6.  
Fabric 3.

**8. 25/5087 B/F** Mich. 5512. PL. I and XI  
Yellow streaked with purple; intact (one burst bubble); no weathering; full of pin-prick bubbles and impurities; blowing spirals noticeable.  
H. 0.038 m. Maj. Ax. 0.145 m. Min. Ax. 0.105 m. A.T. 0.0015 m.  
Rim folded outward and downward, but with a solid and not hollow fold. Straight outsplayed sides. Base slightly concave. True base ring with post technique.  
Fabric 5.

The following are broken but nearly complete:

**9. 24/5012 M/C** Mich. 5508.  
Dark green. Fabric 5.

**10. 27/B 108 B<sup>4</sup>/A.**  
Pale olive green; frosted with patches of milky weathering, pitted. Fabric 5.

**11. 27/C 56 G/Y.**  
Dark yellowish green. Fabric 5.

**12. 25/5048/LI** Mich. 6064.  
Dark green; part of rim, side, and base only; no weathering.  
Fragment of a smallish but well-made and symmetrical dish with convex sides (not concave or straight as in all other specimens of this type).  
Fabric 5.

The following are small fragments:

**13. 24/149/J** Mich. 5367.  
Fragment of base ring and side, green. Scratched decoration on exterior of side and on under side of base. For similar decoration *cf.* nos. 134 and 223. Fabric 5.

**14. 28/B 133 A/E.**  
Fragment of base ring, dark blue, no weathering. Base ring with post technique and faint slanting impressions. Base concave. Fabric 7.

## 2. *Pad base*

Besides the following complete examples fragments of the type were very common.

**15. 28/C 42 J/A** Mich. 5893. PL. XI  
Light yellowish green; intact; usage stains, no weathering; bubbly; black impurities; blowing spirals noticeable.  
H. varies c. 0.047 m. Maj. Ax. 0.23 m. Min. Ax. 0.17 m. A.T. 0.001 m.  
Rim folded outward and downward. Sides outsplayed and pinched in on long axis. Low pad base with faint slanting impressions on exterior of ring and a kick below. In this kick, a flat-edged reamer mark. Post technique. The axes of the rim, the base ring, and the reamer mark are all different. Raised ridge in interior of dish made by the thrust of the base ring from below. The whole shape rather irregular.  
Fabric 3.

## 16. 28/C 42 J/B Mich. 5894.

Light yellowish green; intact; usage stains, no weathering.  
 H. varies c. 0.05 m. Maj. Ax. 0.23 m. Min. Ax. 0.18 m. A.T. 0.001 m.  
 Like no. 15, but more regular shape.

Fabric 3.

## (b) BASE RING WITH PONTIL TECHNIQUE—ALL PAD BASES

Numerous complete examples and many single fragments occurred.

## 17. 25/209 C/T Mich. 5510.

PLS. I and XI

Yellow; intact; no weathering; some bubbles and impurities, but fairly good glass.  
 H. 0.044 m. Maj. Ax. 0.19 m. Min. Ax. 0.141 m. A.T. 0.001 m.  
 Rim folded outward and downward. Concave, outsplayed sides pinched in on long axis.<sup>1</sup> High pad base with criss-cross slanting impressions on exterior of ring and a kick below showing a flat-edged reamer mark. This mark lies along the major axis of the dish, and over it is the pontil mark. The dish tends to have a pointed shape at the ends of both axes, thus approximating more than is usual in these dishes to a lozenge in horizontal section.

Fabric 4.

## 18. 25/209 C/S Mich. 5509.

Yellow; large hole in one side, rim mended; no weathering; material as no. 17.  
 H. 0.047 m. Maj. Ax. 0.207 m. Min. Ax. 0.015 m. A.T. 0.001 m.

Like no. 17, but without the pointed shape at the ends of each axis. The slanting impressions on the base ring are plain and not criss-cross, and the flat-edged reamer mark on the bottom lies along the major axis of the dish.

Fabric 4.

## 19. 26/BC 61 D/E Mich. 5511.

Yellow with purple streaks; intact; no weathering; few bubbles, many brown, sandy impurities; the purple tint appears strongly in the blowing spirals.

H. 0.05 m. Maj. Ax. 0.205 m. Min. Ax. 0.162 m. A.T. 0.001 m.

Like no. 18.

Fabric 4.

## 20. 28/C 42 F/B Mich. 5899.

Yellow; intact; usage stains, no weathering; very bubbly; black impurities on rim, and sand adhering underneath; blowing spirals very noticeable.

H. varies c. 0.04 m. Maj. Ax. 0.193 m. Min. Ax. 0.15 m. A.T. 0.002 m.

Like no. 18.

Fabric 4.

## 21. 28/C 42 F/C Mich. 5900.

Greenish yellow; intact; usage stains, a few traces of incipient iridescence; full of bubbles (especially in base pad); sandy and black impurities.

H. 0.055 m. Maj. Ax. 0.19 m. Min. Ax. 0.152 m. A.T. 0.001 m.

Deeper dish than no. 20. Pinches on long sides very marked; body dinted in at ends of major axis. Base pad very thick and of much more bubbly glass than the rest of the dish. Deep slanting impressions on base ring, but not criss-cross.

Fabric 4.

<sup>1</sup> This pinching was not performed until the base ring was in place, so that on its long sides the base ring has been pressed into a vertical position whereas at the ends it is outsplayed.

## 22. 28/c 42 J/c Mich. 5895.

Light yellowish green; intact; usage stains, no weathering; bubbly and many black impurities; blowing spirals.

H. varies c. 0.05 m. Maj. Ax. 0.197 m. Min. Ax. 0.153 m. A.T. 0.0015 m.

Long sides very slightly pinched. Axis of base ring not quite in line with that of body. Otherwise as no. 18.

Fabric 4.

## 23. 28/c 42 J/d Mich. 5896.

Brownish yellow; intact; usage stains, no weathering; many large bubbles and many black impurities; blowing spirals.

H. varies c. 0.035 m. Maj. Ax. 0.20 m. Min. Ax. 0.15 m. A.T. side 0.0015 m. A.T. base 0.008 m.

A flatter dish than usual. Long sides pinched, but base ring not pinched. Very slight slanting impressions.

Fabric 4.

## 24. 28/c 42 J/e Mich. 5897.

PL. XI

Yellow; intact; usage stains, no weathering; material as no. 23, with adhesion of sandy matter.

H. varies c. 0.06 m. Maj. Ax. 0.20 m. Min. Ax. 0.153 m. A.T. 0.002 m.

A much deeper dish than usual, with lower part of sides rising almost vertically.

Long sides of base ring pinched to beyond the vertical position. Well-marked slanting impressions.

Fabric 4.

## 25. 28/c 42 J/f Mich. 5898.

Pale yellow with purple streaks; intact; usage stains, no weathering; material as no. 24.

H. varies c. 0.052 m. Maj. Ax. 0.215 m. Min. Ax. 0.146 m. A.T. 0.001 m.

Shape as no. 24. Maker's repair in the side.

Fabric 4.

The following is in fragments and incomplete:

26. 25/320 B/A<sup>1</sup>.

Pale yellow; highly iridescent all over. Fabric 4.

## II. FOLDED RIM, INWARD

Only one fragmentary example occurred, with tubular base ring.

## 27. 28/B 167 A/r Mich. 6232.

PL. XI

Green; about half of rim and nearly whole of base ring in seven fragments; no weathering; very bubbly, and some black impurities.

H. c. 0.057 m. Maj. Ax. c. 0.14 m. Min. Ax. c. 0.10 m. A.T. 0.001 m.

Rim folded inward and downward. Sides straight toward top, but curving in markedly to base ring at bottom. Hollow, tubular base ring, with faint traces of post technique on edge. Base concave with slight kick. The whole shape very symmetrical.

Fabric 8.

## III. ROUNDED RIM

Three fragmentary examples only, all with true base ring and post technique.

28. 25/278 D/E Mich. 6048.

PL. XI

Colourless with greenish tinge; whole base ring and part of one side in one fragment, and seven other isolated fragments of side and rim, perhaps not all from same dish; milky weathering in spots, and traces of iridescence and frostiness as well; bubbly in parts, and some white stone; some black impurities on rim.

H. 0.03 m. Maj. Ax. 0.115 m. Min. Ax. 0.085 m. A.T. 0.0015 m.

Rim rounded. Sides outsplayed and slightly concave. True base ring with post technique. Base concave. Ridge within made by the thrust of the base ring from below. Well made and symmetrical.

Fabric 2 or 3.

28 A. 26/B 9 Q/C Mich. 6105.

Fragment of rim of exactly similar type. Fabric 2 or 3.

29. 26/B 10 G/H Mich. 6108.

PL. XI

Colourless with greenish tinge; one fragment of rim, side, and base ring; frosted; material good; a few pin-prick bubbles, and, on rim, some impurities.

H. c. 0.04 m. Maj. Ax. base ring c. 0.07 m. Min. Ax. c. 0.04 m. A.T. 0.002 m.

Rim rounded. Sides outsplayed and slightly concave. True base ring with post technique. Base concave. No ridge within.

Fabric 2 or 3.

## IV. COIL RIM

For the most part this type is represented by isolated rim fragments which do not permit of a complete restoration of their shapes. Three fragmentary specimens, however (see below, nos. 53, 56, 60), are sufficiently preserved for a complete restoration, and there can be no reasonable doubt that the whole group forms one homogeneous type. It falls into two main series:

- (a) Monochrome examples, where the dish and coil are of the same colour;
- (b) Bichrome examples, where the colours of the dish and of the coil are different.

These are subdivided further by colours. Almost all the fragments discovered are listed.

## (a) MONOCHROME

1. *Greenish colourless*

30. 25/249/K Mich. 6038.

PL. XI

Thin coil c. 0.015 m. from rim; dulled surface, good glass. Fabric 2 or 3.

31. 27/C 51 J/Z1 Mich. 6188.

PL. XI

Four coils, one at rim and three others parallel; dulled surface with iridescence in places; bubbly. Fabric 2 or 3.

32. 25/4009 A<sup>1</sup>/K Mich. 6058.

PL. XI

One coil at rim, one c. 0.01 m. down side; no weathering; bubbly, with very bubbly coils. Fabric 3 (?).

33. 28/C 56 K/N.

One coil near rim; milky weathering. Fabric 8.

2. *Light green*

34. 26/B 26 D/D Mich. 6122.

PL. XI

Thick coil at rim, thinner one c. 0.01 m. lower down; dulled surface, frosted in places; very bubbly. Fabric 3 or 8.

35. 28/C 88 C/L Mich. 6238.

One coil c. 0.01 m. from rim; no weathering; pin-prick bubbles. Fabric 4.

36. 28/C 121 G/C Mich. 6241.

As no. 35 exactly.

3. *Light olive green*

37. 27/230 E/FI Mich. 6153.

PL. XI

One thick coil at rim, three thinner ones farther down; no weathering; bubbly, with very bubbly coils. Fabric 3 (?).

4. *Brown*

38. 25/5082 A/B Mich. 6070.

PL. XI

Faint coil near rim, thicker one c. 0.015 m. from rim; no weathering; bubbly. Fabric 5.

5. *Purple*

39. 28/B 136 C\*/D.

Four closely set coils near rim. Fabric 6.

## (b) BICHROME

1. *Colourless with dark green coils*

40. 27/CA 20/TI Mich. 6217.

PL. XI

Colourless with greenish tinge; coil 0.01 m. from rim; no weathering; pin-prick bubbles, with bubbly coil. Fabric 2 (?).

41. 25/4011/L Mich. 6059.

Colourless with greenish tinge; four parallel coils near rim; no weathering; pin-prick bubbles with bubbly coil. Fabric 2 or 3.

42. 25/4011/L Mich. 6059.

PL. XI

Colourless with yellowish tinge; four coils just below rim; no weathering; dish free from bubbles, bubbly coils. Fabric 3 (?).

43. 25/5093 A<sup>2</sup>/B Mich. 6074.

Colourless with yellowish tinge; two thin coils and one thick one near rim; no weathering; bubbly, with very bubbly coils. Fabric 3 (?).

2. *Colourless with blue coils*44. 27/C 51 H<sup>1</sup>/N Mich. 6185.

PL. XI

Colourless with green tinge, faint purplish tints in parts; two thin pale blue coils near rim; no weathering; bubbly with very bubbly coils. Fabric 3 (?).

45. 25/4011/L Mich. 6059.

PL. XI

Almost colourless; one thick light blue coil near rim, one thinner 0.015 m. lower down; no weathering; bubbly, with very bubbly coils. Fabric 3 (?).

46. 28/B 167 E/E.

Colourless; five parallel blue coils near rim; pin-prick bubbles. Fabric 2 or 3.

47. 28/159\*/T Mich. 6225.

Bluish colourless; one dark blue coil at rim, another 0.005 m. lower down; no weathering; pin-prick bubbles. Fabric 3.

### 3. *Pale green with dark green coils*

48. 27/C 61 A/EII Mich. 6210.

PL. XI

Two thin, two thick coils alternately; iridescence beginning; bubbly dish and coils. Fabric 8 (?).

49. 25/4011/L Mich. 6059.

Two thin coils near rim, two more lower down; no weathering; very bubbly dish and coils. Fabric 8 (?).

50. 27/C 53 C/B1 Mich. 6190.

One coil, c. 0.01 m. from rim; no weathering; dish free from bubbles, coil bubbly. Fabric 4 (?).

### 4. *Pale green with blue coils*

51. 26/B 26 F/N Mich. 6123.

PL. XI

Thick dark blue coil at rim; no weathering; dish and coil very bubbly. Fabric 8 (?).

52. 26/B 28 H/E Mich. 6128.

One thick light blue coil at rim, two thinner ones lower down; no weathering; bubbly dish and coils. Fabric 8 (?).

### 5. *Green with light green coils*

53. 26/B 50 B/F Mich. 6139.

About half of dish in four fragments, but not all contiguous; no weathering; very bubbly.

Maj. Ax. c. 0.14 m. A.T. 0.002 m.

Rim rounded, with coil at edge; straight outsplayed sides, concave base, low base ring of true ring type with post technique.

Fabric 5.

54. 28/BS 160/N1 Mich. 6231.

Large coil at rim; no weathering; bubbly. Fabric 3 or 8.

55. 28/157\*/K.

One coil near rim, two others lower down; bubbly. Fabric 5 (?).

### 6. *Green with dark green coils*

56. 27/C 57 H/F Mich. 6206.

Part of rim, side, and base in four fragments; milky weathering; bubbly with some impurities.

Maj. Ax. base ring 0.061 m. Min. Ax. 0.049 m. A.T. 0.001 m.

Rim rounded, large coil c. 0.005 m. from rim. Sides concave and outsplayed. Pad

base ring, vertical, with no slanting impressions; post technique. Base concave with reamer mark.

Fabric 5.

57. 27/c 65 H/B Mich. 6213.

Fragments of two different dishes, coils 0.01 m. from rim; one has milky weathering, the other none; bubbly. Fabric 5 (?).

### 7. *Green with dark greenish blue coils*

58. 24/102 E/1 Mich. 5404.

One thick coil at rim, one thin one 0.025 m. lower down; no weathering; bubbly.

Fabric 5.

59. 28/BS 160/N1 Mich. 6231.

One coil at rim, another 0.01 m. lower down; no weathering; bubbly. Fabric 5.

### 8. *Yellowish green with lighter green coils*

60. 24/112/AM+AN Mich. 5513.

PL. XI

Base and one end only, in one fragment; no weathering; full of bubbles and impurities; noticeable blowing spirals.

H. 0.038 m. Maj. Ax. c. 0.173 m. A.T. 0.0015 m.

Rim rounded, thick coil at edge. Sides straight outsplayed. True base ring, low and vertical, with post technique. Base slightly convex.

Fabric 5.

### 9. *Yellow with light green coils*

61. 24/5021 G/E Mich. 5773.

Two thin coils near rim; no weathering; few bubbles. Fabric 4.

62. 28/c 121 G/C Mich. 6241.

One coil, c. 0.01 m. from rim; no weathering; pin-prick bubbles. Fabric 3 (?).

### 10. *Brown with dark green coils*

63. 25/5082 A/B Mich. 6070.

Thin coil, c. 0.01 m. from rim; frosted at fractures; pin-prick bubbles in dish and coil. Fabric 5 (?).

### 11. *Purple or purplish colourless with light coils*

64. 26/BS 1/J Mich. 6149.

PL. XI

Streaky purplish colourless with thick greenish colourless coil at rim and thinner one just below; no weathering; bubbly with very bubbly coils. Fabric 6.

65. 25/239 C/E Mich. 6035.

PL. XI

Purple with thin colourless coil 0.015 m. from rim; no weathering; bubbly with very bubbly coil. Fabric 6.

66. 25/183/B Mich. 6025.

PL. XI

Pale purple with thick pale green coil at rim and two thinner ones lower down; dulled and iridescent; very bubbly dish and coils. Fabric 6.

67. 28/BS 160/N1 Mich. 6231.

Purple with thick pale green coil at rim; no weathering; few bubbles in dish, bubbly coil. Fabric 6.

68. 28/152\*/AII.

Streaky purple with four pale green coils near rim; no weathering. Fabric 6.

69. 25/181/D Mich. 6024.

Purple with thin pale blue coil *c.* 0.01 m. from rim; iridescent in places; very bubbly dish and coil. Fabric 6.

70. 28/C 49 C/C.

Pale purple with one pale blue coil at rim and another *c.* 0.015 m. lower down; no weathering. Fabric 6.

Many fragments of bases must belong to these dishes with coil rims, but they are not generally distinguishable from bases of types i and ii above. Two fragmentary purple bases, however, may be placed here, for no purple examples of types i and ii have yet come to light.

71. 26/B 7 N/G Mich. 6099.

Base ring, fragmentary, pale purple; frosted all over. True base ring with post technique and faint slanting impressions. Concave base. From a largish dish. Fabric 6.

72. 27/C 61 A/EII Mich. 6210.

Pale purple. Shape and technique as for no. 71. Iridescence in spots. Fabric 6.

Other similar examples occurred.

## B. CIRCULAR PLATES ON BASE RING

No complete specimens were found; all fragments are listed.

I. Smallish plate,<sup>1</sup> with broad, moulded rim and an overhang at the edge; true base ring.<sup>2</sup>

73. 26/B 4 F/E and B 4 L/D Mich. 6092 and 6093.

PL. XI

Colourless with greenish tinge at fracture; the two fragments fit together and form

<sup>1</sup> The plates of subdivisions i and ii belong to a group of colourless polished vessels which is also represented among the shallow bowls (II A v (a) and (b)) and the deep bowls (III A v). They belong chiefly if not entirely to fabric 1.

The vessels appear to have been first pressed into a mould and then polished over their whole surface, and the marks of the rotatory polisher can still be seen clearly on most specimens. This polishing has removed all traces of moulding and marks of manufacture, so that it is impossible to decide whether a pontil or a post has been used, or neither the one nor the other. That the base rings were added separately on these colourless examples is rendered probable, if not certain, by the fact that on some similar millefiori bowls (e.g., one in the British Museum from Crete; see p. 67) the base ring is made of different-coloured glass from that of the rest of the bowl.

<sup>2</sup> For shallow bowls with this type of rim and base ring see II A v (a), p. 83.

about two-thirds of base ring with part of rim and side; milky weathering on one fragment, the other untouched;<sup>1</sup> no bubbles, but some impurities and some holes caused by defective manufacture.

H. 0.015 m. D. 0.132 m. A.T. 0.003 m.

Broad rim, convex on top, with overhang at edge. Bottom of plate horizontal, with slight upward curvature to meet rim. True base ring, vertical. Base flat above, convex below. In centre, above, a small incised circle.<sup>2</sup> Traces of polishing very noticeable.

Fabric 1.

II. A similar type to last, but with no overhang at edge of rim; true base ring.<sup>3</sup>

74. 25/5026 B/M Mich. 6062.

PL. XI

Colourless with strong greenish tinge; five fragments of rim (not contiguous) and one fragment of base ring; milky weathering in spots, and a general dullness all over; some pin-prick bubbles and some black impurities.

H. 0.02 m. D. c. 0.20 m. A.T. 0.002 m.

Broad, moulded rim, concave above, flat below, no overhang. Bottom of plate horizontal with slight upward curvature at edge to meet rim. True base ring, vertical. Base flat above, concave below.

Fabric 1.

75. 24/121 A/K Mich. 5425.

Colourless with yellowish green tinge in fracture; fragment of side and rim; surface dulled; material good.

H. 0.018 m. D. c. 0.12 m. A.T. 0.003 m.

Shape as no. 74.

Fabric 1.

76. 26/B 12 L/G Mich. 6111.

PL. XI

Colourless with greenish tinge at fracture; part of rim, side, and base ring only; frosted on under side, upper side smoother and untarnished; material clear, with very few bubbles.

H. c. 0.015 m. D. c. 0.13 m. A.T. 0.003 m.

Rim not quite so clear-cut, but the plate has essentially the same shape as no. 74.

Marks of polishing very visible.

Fabric 2 (?). A clearer and brighter piece of glass than the rest of its group, and more akin to fabric 2 than to fabric 1. Note the weathering also in this connexion.<sup>4</sup>

<sup>1</sup> Note the effect of environment on weathering; see p. 11.

<sup>2</sup> A similar incised circle is present on examples of this colourless polished ware in classes II and III. With one exception (the very small bowl, no. 169) we find such a circle on every specimen of the ware where the central part of the base is preserved. On the four examples of classes I and II where it exists, it is on the upper side of the base, on the two examples of class III where it exists it is on the under side. The circle is perhaps a mark made by the wheel on which the vessel was held during the polishing process. A similar incised circle may be seen on polished bowls of millefiori glass, and also on cylindrical glass boxes and their lids, e.g., one in the Gans collection in the Antiquarium, Berlin (no. 30219. 213, compare Zahn, *Amtl. Berichten der K. Kunstsamml.*, xxxv, 111, fig. 51), and another in the British Museum (a large box of blue glass, bought in 1873).

<sup>3</sup> For shallow bowls with the same type of rim and base ring see II A v (b), p. 84.

<sup>4</sup> See p. 22 above.

77. 26/B 2 H/YI Mich. 6078.

PL. XI

Colourless with greener tinge than last in fracture; small fragment of rim and side only; milky weathering in spots on under side, upper side untarnished; material clear, but more pin-prick bubbles than no. 76.

A much larger plate than no. 76, D. c. 0.18 m. A.T. 0.002 m.

Shape as no 74. Marks of polishing noticeable.

Fabric 1.

III. Miscellaneous fragments of rim. No further subdivision of these can be attempted until better-preserved specimens are available.

78. 26/B 27 A/Q Mich. 6124.

PL. XI

Colourless with greenish tinge; fragment of rim; frosted on upper side, under side untarnished; material clear with some pin-prick bubbles.

A large plate, D. c. 0.16 m. A.T. 0.002 m.

Edge of rim polished in convex section. Slightly convex side, bent upward at edge to form rim. Outside, at rim, a series of polishing marks, and 0.04 m. from rim a wheel-cut line. No trace of polishing except as noted at rim.

Fabric 2.

79. 28/C 47 E/C1 Mich. 6235.

PL. XI

Colourless with greenish tinge; fragment of rim and side to edge of base ring; incipient frostiness; material good; no bubbles.

D. c. 0.12 m. A.T. 0.002 m.

Plain rim polished in convex section. Horizontal bottom bent upward at its edge at an angle of 45° to form rim. Faint trace of base ring. Traces of polishing all over.

Fabric 1.

80. 25/276 A/G Mich. 6046.

Fragment of rim and side, same type as no 79. Fabric 1.

81. 26/B 12 L/G Mich. 6111.<sup>1</sup>

PL. XI

Colourless with greenish tinge; fragment of rim; no weathering; material clear; some black impurities and some bubbles.

D. c. 0.16 m. A.T. 0.001 m.

Rim moulded after folding over (?). Side of plate flat with upward inclination toward rim. No polishing marks.

Fabric 2.

82. 27/C 57 C/W Mich. 6203.

PL. XI

Colourless with greenish tinge; fragment of rim; frosted on under side; material fair; some black impurities and some pin-prick bubbles.

D. c. 0.16 m. (?) A.T. 0.002 m.

Rim rounded. Side of plate flat with upward inclination toward rim.

Fabric 2.

<sup>1</sup> A complete example of this type is in Cairo, no. 47078, from Karanis, found about 1920; see App., p. 311.

## CLASS II

### SHALLOW BOWLS

THE bowl differs from the plate in having a well-marked vertical or sloping side connecting the bottom with the rim. In the shallow bowls of class II the side is short in comparison with the diameter of the bowl; in the deep bowls of class III the side is longer. Naturally, no hard-and-fast rule of proportion can be laid down for deciding to which of the two classes a particular specimen belongs, but in practice it will be found that, except in the case of bowls with rounded bases, the types themselves are distinctive.<sup>1</sup>

Class II, which is numerically the largest in the collection, is divided into two main groups:

- A. Bowls on base ring;
- B. Bowls with rounded bases.

Further subdivisions are based primarily on rim technique and secondarily on other differences of technique, decoration, or fabric. All the complete specimens so far discovered belong to group A.

The base-ring bowls of group A provide types of shallow bowls parallel in detail and fabric to dishes and plates of class I A and B. Divisions i–iv of this group correspond to divisions i–iv of class I A, whereas the moulded bowls of division v correspond to the moulded circular plates of class I B.

The first four divisions include both early and late types. Among early types should be mentioned the five fragmentary specimens with folded rims listed under i (c), which belong to fabric 2 or 8; the other specimens of fabric 2 with rounded rims listed under iii (a); and probably also some of the coil-rim fragments in division iv. These should all be dated to the third century or earlier,<sup>2</sup> and seem to be prototypes of the others in the group. The vast majority, however, including the numerous complete specimens with folded rims in division i—the only really common type in this group—are probably all post-Constantinian and belong to fabric 3, 4, or 5. They, with their counterparts in classes I and III, represent the ordinary table ware of the latest period at Karanis.

<sup>1</sup> A glance at Plates XII and XIV will show this.

<sup>2</sup> Several of them come from B-period houses of 1926, the earliest houses so far found at Karanis.

The moulded bowls of division v, on the other hand, belong chiefly, if not entirely, to fabric 1. Most of them have been found in early houses. The types were current in the second and third centuries, after which they were superseded by bowls of divisions i–iv.

Elsewhere in Egypt, as at Karanis, the only common type of base-ring bowl seems to have been the late, coloured type with folded rim (division i). Edgar publishes ten examples,<sup>1</sup> there are eight in the Askren collection,<sup>2</sup> and among glass acquired by Cairo since 1905 are seven pieces from Karanis.<sup>3</sup> Other specimens are in the British Museum (from the Fayûm, bought in 1891), in the Victoria and Albert Museum (no. 555. 1891), in the Metropolitan (Egyptian Department, no. 39), in Boston (no. 13. 4299), and in Toronto (nos. G 1915, G 1974, and one, no. G 1858, with a zigzag applied band outside).<sup>4</sup> Seven shallow bowls of coloured glass are published by Edgar (nos. 32401–7) which seem, from his description, to have pushed-in base rings and rounded rims. A similar bowl, of greenish colourless glass with rounded rim and cut-out just below, is in the Petrie collection in University College, London. As the type is not represented at Karanis, and as the pushed-in base ring is common on Syrian bowls, these pieces may be of Syrian fabric. Not one has a definite provenance. Complete examples of the other types are very rare. A specimen in Toronto (G 1862) has a rounded rim (type of division iii 2) and is of brown glass with a plant design in scratched technique on the bottom inside; no. 32445 in Edgar's catalogue also has a rounded rim and scratched decoration. Another rounded-rim type is in the Kaiser Friedrich Museum, Coptic Section. It has a horizontal rim and outsplayed sides: on the under side of the rim is a band of sickle-shaped cuts, and on the exterior of the base ring a series of deep vertical indents.<sup>5</sup> One complete coil-rim bowl is known (Fig. 1, g), which is in the Egyptian Museum, Berlin (no. 19347, see p. 80 below). Of the colourless types with polished or moulded rim, apart from the two fine specimens,<sup>6</sup> one in the Louvre and one in Berlin (Fig. 1, j, pp. 82–3 below), the only complete examples are a very small bowl in Oxford<sup>7</sup> and another

<sup>1</sup> Edgar, *Cat.*, nos. 32423–32.

<sup>2</sup> Mich. 5008–15; see App., p. 319.

<sup>3</sup> Nos. J 41881 a–c and 46456–59; see App., p. 311.

<sup>4</sup> There is an anomalous example of this type in the Egyptian Museum, Berlin, no. 10207, which never had a base ring attached to it.

<sup>5</sup> Wulff, no. 1207, p. 241, pl. lviii.

<sup>6</sup> A third example, almost identical with these two, has recently come into the possession of Mr. R. P. Longden, of Christ Church, Oxford.

<sup>7</sup> No. 1892. 1207; bought in Cairo. H. 0.02 m. D. 0.047 m.

small one from *Oxyrhynchus*<sup>1</sup> in the Victoria and Albert Museum. An important fragment, however, of a type analogous to no. 178 is in Cairo (no. J 47256, from the Fayûm). It is part of the base of a bowl with millefiori inlay on the interior, consisting of a strip of green and yellow glass, opaque white flowers with yellow centres, squares of green with yellow circlets, and squares of alternate red and opaque white strips.

Outside Egypt, though the Egyptian type with folded rim and pad base or true base ring is as rare as its counterpart, the oval dish,<sup>2</sup> other folded-rim bowls are fairly common. For the most part such bowls have base rings of the tubular type, though some have a more obviously pushed-in contour. Such vessels were common in Syria and Cyprus, and examples from these countries can be seen in most collections.<sup>3</sup> Nor were they rare in Gaul and Germany, as many specimens in museums, notably at St. Germain, Lyons, and Cologne, testify. The group is represented in Kisa by forms G 389 and 396-8, and in Morin-Jean by form 89, taken from a snake-thread bowl. The type seems to have been long-lived.

Rounded-rim bowls also are common outside Egypt, particularly during the first two centuries of the Empire. Two main types occur: one with an almost vertical side, another with an elongated S-shaped side and bottom. Both types may have either tubular base rings or base rings of less well disguised pushed-in type, and may be of either coloured or colourless glass.<sup>4</sup> Occasionally a true base ring or a pad base may occur, as, for example, on two bowls of colourless glass from Gelsdorf now in Bonn (U 1176-7), and on bowls from Cologne and Bonn (?) in the Niessen collection.<sup>5</sup>

Coil rims are, curiously enough, very rare, except for examples with one thin thread of similar glass near the rim.

Bowls with moulded and polished rims occur throughout the Empire both in colourless and in fine-coloured wares of early date (millefiori and the like). Colourless moulded-rim bowls, some with,

<sup>1</sup> No. 1917 a. 1897; found by Grenfell and Hunt in 1896-7, along with a small colourless flask (1917. 1897), type IX A i (a) 1, p. 187.

<sup>2</sup> For examples from Jerash and Köln-Müngersdorf with rim folded down to the junction of the side and bottom see p. 71 below. There is a pad-base fragment from a shallow bowl of bluish green glass in Mayence, found locally.

<sup>3</sup> There is an example in the British Museum, from Tyre, bought in 1898; see also Cesnola, *Atlas*, iii, pls. lxxxviii, 3-5, and cvi, 7, all from Idalium.

<sup>4</sup> For good examples see *Niessen Cat.*, nos. 948, 952-3, and 958-9, pl. xlviii, all from Cologne.

<sup>5</sup> *Niessen Cat.*, nos. 950 (from Cologne) and 1099 (from Bonn?), pl. xlviii.

some without overhang, are preserved in the British Museum,<sup>1</sup> Cologne,<sup>2</sup> Marseilles,<sup>3</sup> Manchester,<sup>4</sup> and Cambridge,<sup>5</sup> the last with a cut design of a duck and plants (Fig. 1, c); and fragments of a rim and side may be quoted from London,<sup>6</sup> Nîmes,<sup>7</sup> Vaison,<sup>8</sup> and Trèves.<sup>9</sup> There is in Marseilles<sup>10</sup> a fragment of such a bowl with cut decoration on the exterior of both the base and the side. Of coloured wares there are examples in Breslau (mosaic spirals on a purple ground);<sup>11</sup> in the Antiquarium, Berlin (green, red, and yellow millefiori); in Cologne (variegated purple and opaque white glass);<sup>12</sup> and in St. Germain (fine, dark green glass).<sup>13</sup> Lastly, in the British Museum there is a fragment of one of these bowls which combines cut decoration on the under side (a male figure in a pointed cap surrounded by a floral pattern) with millefiori inlaid squares on the upper side (as no. 178).

All these types correspond closely—in most cases exactly—with the Egyptian types of division v, and in all probability they are of Egyptian fabric. Like their counterparts, the oval dishes with handle-plates and the circular plates with moulded rims, they are derived from metal originals.<sup>14</sup> Very similar shapes, also no doubt copied from metal originals, were popular with the *terra-sigillata* potters of the first and second centuries.<sup>15</sup>

Types with plain polished rims are rarer; examples occur chiefly

<sup>1</sup> From Nervi near Bordighera, bought in 1887. It is a small example exactly parallel to no. 169, and certainly made in Egypt.

<sup>2</sup> No. 757, from Cologne. This example has a definite bluish green tint.

<sup>3</sup> No. 444, from Arles.

<sup>4</sup> From Gerar, Palestine, 1927, found with a Byzantine lamp.

<sup>5</sup> From Girton, near Cambridge, found in a Roman cremation-burial of the second century in the middle of an Anglo-Saxon cemetery; see E. J. Hollingworth and M. M. O'Reilly, *Anglo-Saxon Cemetery at Girton College* (Cambridge, 1925), p. 32, pls. xi and xii.

<sup>6</sup> British Museum, British and Mediaeval Department.

<sup>7</sup> In the Maison Carrée, found along with a quantity of fragments of early Imperial glass in an ancient quarry near the Roman ramparts.

<sup>8</sup> Found in recent excavations.

<sup>9</sup> From the newly discovered Tempelbezirke; now in the Museum.

<sup>10</sup> No. 388, found in Rome; see Froehner, *Cat. des antiq. grecques et romaines, Musée de Marseille*, p. 113.

<sup>11</sup> From Sackrau; see Kisa, p. 528, fig. 197.

<sup>12</sup> No. 643; from the Aachenerstrasse, Cologne.

<sup>13</sup> No. 31874; from Corent, Puy-de-Dôme, found with an Arvernian gold coin.

<sup>14</sup> Compare, e.g., a silver specimen in Cologne, no. 24. 235, from Köln-Bickendorf, which was found with late third-century coins, though the date of its manufacture was probably earlier.

<sup>15</sup> Compare Dragendorff, forms 18, 31, and 51; Oswald and Pryce, *Terra Sigillata*, pp. 181–3 and 202, pls. xlvi–lxvi and Ix.

in millefiori or fine monochrome ware, like the large bowl of opaque green glass in the Victoria and Albert Museum.<sup>1</sup> An interesting bowl of this type from Crete in the British Museum (Franks collection, 1880) has a base ring of different glass from that of the rest of the vase; this proves that on these bowls the base ring was sometimes, if not always, added on the principle of the true ring and not moulded with the vase. The body is made of colourless glass with an opaque net thread inserted; the rim is composed of brown and white and blue and white bands; and the base ring is of colourless glass with white, blue, and yellow net-threads. Colourless specimens are also found, for example, four little bowls in Cologne (no. 755, from Köln-Müngersdorf) made in descending sizes to fit into each other.

The round-based bowls of group B have no counterparts in class I, but a parallel group of deep bowls with rounded bases (class III B) exists, and it is often difficult to decide to which of these two classes a particular specimen belongs. The only decisive criterion is the comparative relation of the depth to the diameter of the bowl; otherwise the types are identical.

These bowls are subdivided primarily according to their rim technique and secondarily according to decoration. The group is only represented by fragmentary specimens, but the types are for the most part well known and complete examples of them may be seen in most large collections of Roman glass, since they are found all over the Roman Empire.

The specimens belong, almost without exception, to fabric 2 or to millefiori fabrics, and the majority have been found in early houses.<sup>2</sup> Their manufacture must be dated at the latest to the second or early third century. Every known fragment is listed and they can never, therefore, have been so common at Karanis as the later coloured wares of group A. However, since they must have been always expensive, the occurrence of even this number of fragments points to a greater standard of luxury than might have been expected in a small provincial Egyptian town.

Very few fragments, and not a single complete example, of these round-based shallow bowls have been recorded from other sites in Egypt. Edgar published one fragment of colourless cut ware<sup>3</sup> which

<sup>1</sup> No. 975. 1868; provenance uncertain. H. 0.03 m. D. 0.17 m.

<sup>2</sup> The few pieces that were found in later houses are certainly heirlooms.

<sup>3</sup> Edgar, *Cat.*, no. 32740. Part of the central decoration from the base of a bowl, with a female head in profile to right; good cutting.

might belong to a bowl of this type, and stray fragments of the same kind exist in museums and collections. There is, for example, in the British and Mediaeval Department of the British Museum, a fragment with part of an inscription (z)HCAIC cut on the exterior.<sup>1</sup> A second example is an almost complete base of such a bowl in the Petrie collection in University College, London, of greenish colourless glass, fabric 1, with a geometric cut design. Other fragments, unpublished and unnoticed, exist in the collections in Cairo, London, and elsewhere. The most important is a fragment of a shallow bowl of fabric 2 with rounded rim, which is in the Victoria and Albert Museum (no. 365. 1900, Myers collection). It bears a polychrome design depicting a bird perched on a rock between plants (Fig. 1, h).

In other provinces the types are commoner. The most usual shape of colourless examples is a bowl with polished or unworked rim and a constriction just below. Shallow bowls of early date are not so common as the deeper varieties (class III), but there is an important example in the Niessen collection found in the Luxemburgerstrasse in Cologne;<sup>2</sup> round a central design, depicting a bust of a bearded man in a Phrygian cap, runs a frieze consisting of a duck,<sup>3</sup> a fish, grape-clusters, and baskets of fruit. Similar to this, but bearing geometrical facets only, is an example in Bonn<sup>4</sup> found at Gelsdorf with a grave group dated c. 200–10. Both these pieces were certainly made in Egypt;<sup>5</sup> they are identical in fabric and technique with the Karanis fragments of division B ii (a). A similar bowl, of colourless glass, but without the constriction just below the rim, and with a figure design, Apollo with lyre, and Minerva, in rather late and scratchy cutting, is in the British Museum.<sup>6</sup>

By the fourth century a type of saucer-shaped bowl had grown up which became very widespread in the west. It is found with various decorations, chiefly cut designs, bands of incisions, or blobs, and, though of colourless or almost colourless glass, it is usually of poor fabric and technique. As the shape is too shallow to have been

<sup>1</sup> From Oxyrhynchus, found by Grenfell and Hunt, 1903; see *Egypt Exploration Fund, Arch. Rep. 1902–3*, p. 7 (inscription there wrongly given ΗΣΥΙΣΝ).

<sup>2</sup> Niessen Cat., no. 342, pl. xxviii.

<sup>3</sup> There is a duck of identical pattern on no. 311, class III.

<sup>4</sup> U 1169; Lehner, *Führer*, 1<sup>2</sup>, 77–8. For the decoration compare no. 189.

<sup>5</sup> S. Loeschcke, Niessen Cat., p. 34, says: 'Wie die Technik, so ist auch die Form nicht die meist übliche, da der Schalenboden stark abgeplattet ist,' i.e., it is not like the later bowls which are of western fabric and have a truer segmental section.

<sup>6</sup> Bought in 1887; from Budrum in Asia Minor.

serviceable as a drinking vessel, we must look for another use to which it might have been put. A suggestion has been made<sup>1</sup> that it may have been a hanging lamp. The type is that of Kisa, c 388, and Morin-Jean, form 70. Examples may be seen in almost every collection of Roman glass.<sup>2</sup>

In millefiori and coloured wares bowls of plain segmental section with either polished or rounded rims occur. Kisa illustrates several examples,<sup>3</sup> and there are others in the British Museum<sup>4</sup> and elsewhere. Mention should be made also of the so-called pillar-moulded bowls, the majority of which belong to this class rather than to class III.<sup>5</sup> The type is that of Morin-Jean, form 68, and is found in both monochrome wares (green, blue, &c.) and in polychrome (millefiori, mosaic, and marbled glass). Fragments of these pillar-moulded bowls are common all over the Empire, and are one of the most characteristic finds on early sites.<sup>6</sup>

#### SKELETON CLASSIFICATION

##### A. With base ring

- I. Folded rim, outward
  - (a) Base ring with post technique—all true base rings
  - (b) Base ring with pontil technique—all pad bases
    - 1. Almost rectangular contour
    - 2. Wide obtuse-angled contour
    - 3. Irregular crooked contour
  - (c) Pushed-in base ring
- II. Folded rim, inward

<sup>1</sup> See Crowfoot and Harden, pp. 202 ff., pl. xxix, 19.

<sup>2</sup> Compare, e.g., an example in the Louvre, ΠΙΕ ΖΗΧΗC round a central leaf design, all in scratched technique; another in the Berlin Antiquarium from Cobern with a scratched design of Neptune and sea monsters and bearing the legend AMANTIBUS PROFINO (Kisa, fig. 262; Morin-Jean, p. 240, fig. 325); another in Mayence (no. 4555) with a hunting scene in scratched technique and the legend VALERI VIVAS; and a fourth in Cologne (no. 935) with a well-cut geometrical design. Other examples with cut or scratched decoration are published in Niessen *Cat.*, no. 345, pl. xxii; no. 339, pl. xxviii; no. 340, pl. xxx. For examples with blob decoration see *ibid.*, nos. 150-1, pl. xiii. The type seems hardly to occur in the east, though there is an example in the Berlin Antiquarium of bluish green glass with polished rim and blue-blob decoration which comes from the Crimea, and is probably of Syrian fabric, and a similar bowl from Cyprus is in the British Museum (formerly in the Cesnola collection).

<sup>3</sup> E.g., fig. 213, from Hellange; fig. 216, from Cologne; pl. iv, 2, from Cologne.

<sup>4</sup> Slade collection, no. 87 (*Slade Cat.*, p. 17), and two others bought with the Slade bequest, 1870.

<sup>5</sup> And yet the only fragment so far discovered at Karanis is from a deep bowl, no. 310 below.

<sup>6</sup> Compare, e.g., Morin-Jean, fig. 151; Kisa, figs. 212 and 214; and, from the east, no. 1888. 1301 in Oxford from Kuklia, Cyprus, and Reinach, *Antiq. Bosp. Cimm.*, p. 124, pl. lxxviii, 5 from Kerch.

- III. Rounded rim
  - 1. Colourless wares
  - 2. Coloured wares
- IV. Coil rim
  - (a) Monochrome
    - 1. Green
    - 2. Yellowish colourless
  - (b) Bichrome
    - 1. Colourless with bluish green coils
    - 2. Green with lighter green coils
    - 3. Olive green with lighter green coils
    - 4. Olive green with darker green coils
    - 5. Pale yellow with pale green coils
    - 6. Yellow with green coils
    - 7. Purplish colourless with greenish colourless coils
    - 8. Purple with almost colourless coils
    - 9. Yellowish purple with almost colourless coils
- V. Moulded or polished rim
  - (a) Sharply offset rim with overhang at edge
  - (b) Sharply offset rim with no overhang at edge
- B. With rounded base
  - i. Plain rim, rounded or polished
    - (a) Wheel-cut pattern
    - (b) Millefiori inlay pattern (on interior)
    - (c) Millefiori fabric
      - 1. Designs extending through the whole thickness of the glass
      - 2. Designs inlaid on interior of bowl
    - (d) With marvered-in festoons
  - ii. Polished rim, with constriction in the side just below
    - (a) Cut or incised decoration
    - (b) Raised vertical ribs
    - (c) Moulded decoration on exterior
  - iii. Variant types of rim

## A. WITH BASE RING

### I. FOLDED RIM, OUTWARD

#### (a) BASE RING WITH POST TECHNIQUE—ALL TRUE BASE RINGS

Numerous complete examples and many fragments occurred.

83. 28/B 158 A/F, G Mich. 5891.

PLS. II and XII

Two identical bowls, the largest bowls found at Karanis.

Brownish yellow; F intact, G in fragments (complete?); usage stains, no weathering; bubbly with some impurities; blowing spirals.

H. 0.065 m. D. rim 0.25 m. D. base ring 0.125 m. A.T. 0.001 m.

Hollow rim, folded outward and downward. Sides vertical. Bottom convex, meeting sides in a rounded obtuse angle, and with downward slope toward base ring. Base flat. True base ring, high and outsplayed, with faint slanting im-pressions. Post technique.

Fabric 5.

## 84. 24/5020 A/M Mich. 5829.

Dark yellow, with purple streaks in base ring; complete, in many fragments; no weathering; material fair; some stone.

D. base ring 0.11 m. A.T. 0.0015 m.

Shape as last, but base ring slopes inward.<sup>1</sup>

Fabric 5.

## 85. 25/239 A/K X 2 Mich. 5528-9.

Two identical bowls.

Greenish colourless; each complete, but in fragments; no weathering; many pin-prick bubbles; traces of impurities.

H. c. 0.06 m. D. c. 0.24 m. A.T. 0.001 m.

Hollow rim, folded outward and downward. Sides outsplayed. Bottom horizontal and meeting sides in a rounded obtuse angle. In one example base slightly convex, in the other slightly concave. True base ring, short and almost vertical, with faint slanting impressions. Post technique.

Fabric 3.

## 86. 27/C 56 G/Z.

Greenish colourless; almost complete, in fifteen fragments; spots of milky-pitting weathering; bubbly, with sandy and black impurities.

D. c. 0.20 m. A.T. 0.001 m.

Shape as no. 85, but a shallower bowl.

Fabric 3.

## 87. 25/5087 B/I.

Dark olive green; almost complete in ten fragments; spots of milky weathering; bubbly.

D. c. 0.16 m. A.T. 0.002 m.

Like no. 86 in shape, but no trace of slanting impressions on base ring.

Fabric 5.

The following example of an unusual type of folded rim belongs to this group, as is proved by a reconstructible example of the type from Egypt in the Petrie collection in University College, London:<sup>2</sup>

## 88. 27/C 45 B/W Mich. 6180.

PL. XII

Olive green; fragment of rim and side; milky weathering in parts; bubbly.

D. c. 0.22 m. A.T. c. 0.0015 m.

Hollow rim, folded outward and downward; the fold of the glass passes from the lip down the whole side of the bowl and underneath the angle at the junction of the side and the bottom, where it is folded outward again. It leaves a tubular hollow at the lip and cleaves closely to the side of the vessel until it is folded out to another tubular hollow at the end.

Fabric 4 or 5.

<sup>1</sup> Probably this is an unintentional peculiarity.

<sup>2</sup> Two Syrian parallels are in Oxford. One, a complete bowl from Tyre (Fortnum Coll. G 22), and the other, no. 1930 13, a fragment of rim and side only, found in a Byzantine level at Jerash, Transjordania, 1929. Another complete example is in Cologne (no. 26. 967). It was found at Köln-Müngersdorf in 1926 in a sarcophagus-burial dated by the finders c. 370 (Fremersdorf, *Röm. Gläser*, pp. 11-12; *id.*, *Der römische Gutshof Köln-Müngersdorf*, p. 94, pl. 51, 10) along with two other glasses of probable Egyptian origin; see pp. 49, 65, and 136.

## (b) BASE RING WITH PONTIL TECHNIQUE—ALL PAD BASES

Numerous complete examples,<sup>1</sup> and very many small fragments occurred. The contours of these bowls vary from an almost rectangular to an irregular crooked section.<sup>2</sup>

1. *Almost rectangular contour*

**89.** 28/c 42 F/D Mich. 5910.

PL. XII

Pale yellow, almost colourless in thinner parts; intact; usage stains, and faint traces of iridescence; fairly bubbly, but a well-made bowl and very symmetrical.

H. 0.035 m. D. 0.15 m. A.T. 0.001 m.

Hollow rim, folded outward and downward in triangular form. Sides vertical.

Bottom horizontal, meeting sides in a curved right angle. Base concave, with pointed reamer mark, and with pontil mark superimposed on it. Low pad base with vertical ring, and slanting impressions on exterior.

Fabric 3.

**90.** 25/209 c/B Mich. 5514.

PLS. II and XII

Yellow; intact; no weathering; very bubbly but few impurities; blowing spirals noticeable.

H. 0.058 m. D. 0.159 m. A.T. 0.0025 m.

Hollow rim, folded outward and downward. Sides vertical. Bottom nearly horizontal,<sup>3</sup> meeting sides in a curved right angle. Base concave with pointed reamer mark, and pontil mark superimposed on it: much of pontil wad still remaining. Pad base with outsplayed ring higher than that of last example; criss-cross slanting impressions on exterior. Symmetrical bowl except for one accidental dent in side.

Fabric 4.

**91.** 25/209 c/C Mich. 5515.

Yellow; intact; no weathering; bubbly with many black and brown impurities.

H. 0.045 m. D. 0.15 m. A.T. 0.002 m.

Shape and technique as no. 90.

Fabric 4.

**92.** 25/209 c/D Mich. 5516.

Yellow; intact; no weathering.

H. 0.051 m. D. 0.148 m. A.T. 0.002 m.

Shape, technique, and material as no. 91.

Fabric 4.

**93.** 25/209 c/E Mich. 5517.

Yellow, with slight streak of purple in base; intact; usage stains, no weathering.

H. 0.044 m. D. 0.14-0.144 m. A.T. 0.0015 m.

Asymmetrical. Technique and material as no. 91.

Fabric 4.

<sup>1</sup> More specimens of this were found than of any other type of vase in the collection.

<sup>2</sup> It is probable that the glass-blower was always aiming at a rectangular contour.

<sup>3</sup> On this and the rest of the vases in this division the bottom is always more or less horizontal, with, usually, a slight dip downward where it joins the base.

## 94. 25/209 C/F Mich. 5518.

Yellow, with purple traces; intact; no weathering; material very bad; full of bubbles and impurities; blowing spirals noticeable.

H. 0.046 m. D. 0.138 m. A.T. 0.002 m.

Technique as no. 90; an asymmetrical bowl.

Fabric 4.

## 95. 25/209 C/G Mich. 5519.

Yellow; intact; no weathering; material fair, but some bubbles and impurities; blowing spirals noticeable.

H. 0.052 m. D. 0.159 m. A.T. 0.002 m.

Shape and technique as no. 90.

Fabric 4.

## 96. 25/209 C/K Mich. 5520.

Light greenish yellow; hole in one side; usage scratches, slight traces of iridescence; material very bubbly, specially in one patch in base pad;<sup>1</sup> many brown, sandy impurities; blowing spirals.

H. 0.057 m. D. 0.148 m. A.T. 0.002 m.

Shape and technique as no. 90, but not very symmetrical.

Fabric 4.

## 97. 25/209 C/L Mich. 5521.

Light greenish yellow with purple streaks; hole in one side; usage scratches, no weathering; bubbly, with many brown, sandy impurities; blowing spirals.

H. 0.049 m. D. 0.172 m. A.T. 0.0015 m.

Shape and technique as no. 90. Contour not symmetrical owing to accidental flattening on one side before annealing.

Fabric 4.

## 98. 25/209 C/J Mich. 5522.

Yellowish green; intact; a few small patches of incipient iridescence; material fair, with fewer bubbles and impurities than no. 97; blowing spirals noticeable.

H. 0.056 m. D. 0.144 m. A.T. 0.0015 m.

Shape and technique as no. 90, but more symmetrical.

Fabric 4.

## 99. 25/209 C/M Mich. 5523.

Yellowish green; one radiate crack starting from a blob of unfused sand; slight traces of incipient iridescence; bubbly, and full of impurities; some blobs of unfused sand, and, on under side of base, bits of sand picked up by the vessel before annealing; blowing spirals noticeable.

H. 0.06 m. D. 0.159 m. A.T. 0.0015 m.

Shape and technique as no. 90, but slightly higher base ring.

Fabric 4.

## 100. 26/BC 61 D/C Mich. 5524.

Light greenish yellow with purple streaks; intact; no weathering; full of bubbles and brown impurities; blowing spirals very noticeable owing to purple tints.

<sup>1</sup> Since this patch of bubbles extends over both the ring itself and also the central part of the pad, it is certain evidence that the base was added as a pad and not as a true ring.

H. 0.054 m. D. 0.149 m. A.T. 0.002 m.

Shape and technique as no. 90, but reamer mark flat-edged and not pointed. Rim dented on one side.

Fabric 4.

**101.** 27/C 56 G/NI Mich. 5902.

PL. XII

Greenish yellow; intact; no weathering; very bubbly; bits of sand picked up by glass before annealing; black impurities.

H. 0.052 m. D. 0.159 m. A.T. 0.001 m.

General shape as no. 90, but sides slope outward from rim to bottom, and the junction of the sides and bottom is a curved acute angle. Well-marked but not criss-cross slanting impressions on base ring. Pointed reamer mark on base.

Fabric 4.

**102.** 27/C 56 G/01 Mich. 5903.

Greenish yellow; intact; no weathering; material as no. 101.

H. varies 0.053-0.06 m. D. 0.166 m. A.T. 0.002 m.

Shape and technique as no. 90, but sides and bottom meet in a more rectangular junction.

Fabric 4.

**103.** 28/C 42 F/E Donor.

Greenish yellow; intact; usage stains, no weathering; bubbly, with impurities; blowing spirals.

H. 0.045 m. D. 0.145 m. A.T. 0.001 m.

Shape and technique as no. 90, but base ring very much outsplayed and almost flat, criss-cross slanting impressions, and no trace of reamer mark.

Fabric 4.

**104.** 28/C 42 J/G Mich. 5908.

Yellow; intact; usage stains, no weathering; very bubbly; not many impurities; blowing spirals.

H. 0.052 m. D. 0.162 m. A.T. 0.001 m.

Shape as no. 90; pointed reamer mark.

Fabric 4.

The two following specimens are fragmentary:

**105.** 25/320 B/A<sup>2</sup>.

Green;<sup>1</sup> almost complete in nineteen fragments; highly iridescent all over; material indiscernible owing to weathering.

D. c. 0.13 m. A.T. 0.001 m.

Shape as no. 90. A small and very symmetrical piece.

Fabric 4.

**106.** 25/223 A/A.

Greenish yellow; almost complete in thirteen fragments; highly iridescent all over; bubbly.

D. c. 0.16 m. A.T. 0.0015 m.

Shape as no. 90, but larger and thicker bowl, and slanting impressions not criss-cross. Fabric 4.

<sup>1</sup> This was the only green example found.

2. *Wide obtuse-angled contour*

107. 25/320 C/B Mich. 5911.

PL. XII

Greenish yellow; intact, but repaired on base ring; usage scratches, highly iridescent all over; very bubbly; some black impurities on rim.

H. 0.048 m. D. 0.152 m. A.T. 0.0013 m.

Hollow rim sloping inward from sides and folded outward and downward. Sides and bottom meet in a very wide obtuse angle which gives them an almost unbroken, curved profile. Concave base with pointed reamer mark and pontil mark superimposed on it. Pad base with outsplayed ring upon which are criss-cross slanting impressions.

Fabric 4.

3. *Irregular crooked contour<sup>1</sup>*

108. 28/C 42 J/H Mich. 5904.

PLS. II and XII

Brownish yellow; intact; usage stains, no weathering; material fair, with numerous pin-prick bubbles but no impurities; blowing spirals.

H. 0.054 m. D. 0.16 m. A.T. 0.001 m.

Hollow rim, folded outward and downward. Sides and bottom form together an outsplayed, crooked contour. Concave base with pointed reamer mark and pontil mark superimposed on it. Base pad with outsplayed ring upon which are very faint slanting impressions.

Fabric 4.

109. 28/C 42 J/K Mich. 5906.

Deep yellow; intact; usage stains, no weathering; material bad and bubbly, with impurities.

H. varies 0.061–0.072 m. D. 0.175 m. A.T. 0.001 m.

Shape and technique as no. 108.

Fabric 4.

110. 28/C 42 J/J Mich. 5905.

Deep yellow; intact; usage stains, slight traces of iridescence; material bad and bubbly; black impurities on rim.

H. varies 0.06–0.065 m. D. 0.156 m. A.T. 0.001 m.

Shape and technique as no. 108, but rim inclined inward, and well-marked slanting impressions on base ring.

Fabric 4.

111. 28/C 42 J/L Mich. 5907.

Deep yellow; intact; usage stains, no weathering; material as no. 110.

H. varies 0.042–0.045 m. D. 0.165 m. A.T. 0.0015 m.

Shape and technique as no. 108. Criss-cross slanting impressions on base ring.

Fabric 4.

112. 28/C 42 F/F Mich. 5909.

Yellow; intact; usage stains, one patch of iridescence; material as no. 110.

H. varies 0.034–0.044 m. D. 0.134 m. A.T. 0.001 m.

Shape and technique as no. 108. Rim bent inward.

Fabric 4.

<sup>1</sup> The individual irregularities of contour in each specimen have not been recorded.

**113.** 25/209 c/h Mich. 5525.

Yellow; intact; no weathering; few bubbles and impurities; blowing spirals hardly noticeable.

H. 0.058 m. D. 0.144 m. A.T. 0.001 m.

Shape and technique as no. 108. A very symmetrical bowl. Only a faint trace of a reamer mark.

Fabric 4.

**114.** 25/209 c/n Mich. 5526.

Yellow; intact; no weathering; fairly bubbly.

H. 0.06 m. D. 0.161 m. A.T. 0.0015 m.

Shape and technique as no. 108, but a shallower bowl with higher base ring.

Fabric 4.

**115.** 25/209 c/o Mich. 5527.

Yellow; intact; no weathering; material bad and bubbly; full of impurities; blowing spirals prominent.

H. 0.055 m. D. 0.138 m. A.T. 0.001 m.

Shape and technique as no. 108. Flat base with pontil mark but no trace of reamer mark.<sup>1</sup>

Fabric 4.

**116.** 25/209 c/p Mich. 5501.

PL. XII

Yellow; intact; no weathering; material bad and bubbly with many black and sandy impurities; blowing spirals very noticeable.

H. 0.043 m. D. 0.168-0.171 m. A.T. 0.0015 m.

Shape and technique as no. 108. A much shallower bowl than any of the foregoing.<sup>2</sup>

Fabric 4.

### (c) PUSHED-IN BASE RING

Only five fragmentary specimens occurred.

**117.** 28/B 167 A/R Mich. 6232.

PL. XII

Bluish green; base ring complete and three rim fragments; no weathering; very bubbly; some impurities and unfused sand.

H. 0.024 m. D. 0.14 m. A.T. 0.0008 m.

Hollow rim folded outward and downward. Well-outsplayed sides, joining bottom in an obtuse angle. Bottom curves upward from sides to centre of bowl. Deeply concave base with pointed reamer mark and pontil mark superimposed on it. Tubular base ring.

Fabric 8.

**118.** 28/B 152 B/RI Mich. 6230.

PL. XII

Greenish colourless; base ring complete and one rim fragment; no weathering; material as no. 117.

H. 0.025 m. D. 0.112 m. A.T. 0.0008 m.

Shape similar to no. 117, but bottom slopes downward from sides to centre of bowl, and base not so deeply concave.

Fabric 8.

<sup>1</sup> It is likely, however, that a reamer was used here also, as on all the rest, to push the pad into place.

<sup>2</sup> It might perhaps have been classed as a plate, but it is more akin to these shallow bowls than to any vase in class I.

**119.** 26/B 27 G/M Mich. 6127.

Greenish; base ring complete; no weathering; material as no. 117.  
D. base ring 0.075 m. A.T. 0.001 m.

Shape as no. 117.

Fabric 8.

**120.** 24/169 AW<sup>1</sup>/G Mich. 5412.

PL. XII

Colourless with faint greenish tinge; base ring complete; no weathering; material excellent; very few bubbles and impurities.

D. base ring 0.068 m. A.T. 0.001 m.

Bottom slopes downward toward base. Concave base with tubular base ring. No trace of reamer or pontil mark.<sup>1</sup> Raised coil, fused in, in centre of under side of base, and a thinner coil trailed horizontally round vase outside base ring.

Fabric 2.

**121.** 24/169 AB/L Mich. 5410.

Buff colourless; fragment of base ring and part of side; dulled, no weathering; material good; few bubbles and no impurities.

D. base ring 0.047 m. A.T. 0.001 m.

Vertical (?) sides, meeting bottom in an obtuse angle. Bottom slopes downward toward centre of bowl. Pushed-in base, slightly concave, with faint reamer mark and post technique.

Fabric 2.

## II. FOLDED RIM, INWARD<sup>2</sup>

Only the following complete example and no fragmentary specimens were found. The type has not been found elsewhere in Egypt.

**122.** 25/320 C/A.

PL. XII

Yellow; complete, in eighteen fragments; highly iridescent over almost whole surface; bubbly.

D. 0.164 m. A.T. 0.0015 m.

Rim bent outward at right angles to side and then folded upward and inward. Sides vertical and meeting bottom in right angle. Bottom almost horizontal. Concave base with pointed reamer mark and pontil mark superimposed on it. Pad base with outspread ring upon which are criss-cross slanting impressions.

Fabric 4.

## III. ROUNDED RIM

All have true base rings with post technique.

### 1. Colourless wares

Only the following specimens, all fragmentary, were found:

**123.** 26/B 4 O/K Mich. 6094.

PL. XII

Colourless with greenish tinge; about half of bowl in nine fragments; no weathering; material good, but some pin-prick bubbles and some black impure streaks on edge of rim; a few traces of stone.

<sup>1</sup> The reamer must have been used to push in the base, but the vase is of such good technique that no trace of its mark remains.

<sup>2</sup> For inward-folded rims on deep bowls see III A ii below. Examples also occur on flasks in class IX. The technique is more difficult than outward folding, and is therefore rarer.

H. 0.038 m. D. 0.162 m. A.T. 0.002 m.

Rounded rim.<sup>1</sup> Sides vertical, meeting bottom in an obtuse angle. Bottom slopes slightly downward toward base ring. Base slightly concave. True base ring, short and vertical, with post technique. A very symmetrical piece.

Fabric 2.

**124.** 28/152\*/AII.

25/5026 B/M Mich. 6062.

Rim fragments only, similar in all respects to no. 123, but frosted. Fabric 2.

**125.** 26/B 24 P/J Mich. 6119.

28/B 167 A/R Mich. 6232.

Two fragments of rim and side, similar to no. 123, but with more outward-sloping sides. Fabric 2.

**126.** 24/169 v/T Mich. 5455.

Colourless with greenish tinge at fracture; fragment of rim and side; no weathering; material good.

H. of side 0.03 m. D. 0.08 m.

Shape as no. 123, but rim bent slightly inward.

Fabric 2.

**127.** 28/C 102 F/H.

A shallower bowl, otherwise as no. 123.

**128.** 26/B 4 E/G Mich. 6091.

PL. XII

Colourless with greenish tinge; fragment of rim and side; frosted; few bubbles; impurities and blobs of sand on rim.

D. c. 0.18 m. A.T. 0.001 m.

Rounded rim.<sup>2</sup> Side tapers downward, and meets bottom in an obtuse angle.

Trailed-on thread of similar glass, horizontally, at angle of side and bottom.

Fabric 2.

**129.** 28/CS 100/01 Mich. 6239.

PL. XII

Colourless with greenish tinge; fragment of rim and side; no weathering; few bubbles, no impurities.

Shape and dimensions similar to no. 128: trailed-on thread as before.

Fabric 2.

## 2. *Coloured wares*

One example is nearly complete, the rest are fragments only; all known fragments are listed.

**130.** 28/C 42 J/AI Mich. 5892.

PLS. II and XII

Yellowish green; in many fragments, four small pieces missing; usage stains, incipient iridescence; bubbly with some impurities.

<sup>1</sup> In cases like this, where the rim is fairly thick, probably the edge of the glass was folded over after knocking off and before the rounded contour was obtained by re-fusing the glass in a flame. Even at a fracture, however, there is now no sign of such folding. See, further, *s.vv.* 'Folded' and 'Rounded' rims, p. 13 above.

<sup>2</sup> The rim is here thinner than on the preceding examples, and it is unlikely that it was folded over before rounding.

H. varies 0.073-0.079 m. D. 0.23 m. A.T. 0.002 m.

Rim bent outward horizontally and rounded. Vertical sides, meeting bottom in an obtuse angle. Bottom slightly concave and sloping gently downward to base ring. Base concave. True base ring, large, heavy, and outsplayed, with faint slanting impressions. Post technique.

Fabric 4 or 5.

**131.** 25/230 B/L Not retained.

Olive green; less than half the bowl in seven fragments; traces of iridescence.

D. base ring 0.13 m. A.T. 0.002 m.

As no. 130 exactly.

Fabric 3 or 4.

**132.** 27/C 56 A/O Mich. 6197.

25/229 B/B Mich. 6030.

Rim fragments, type as no. 130.

**133.** 24/5025 A/D Mich. 5766.

PL. XII

Greenish yellow; rim fragment; no weathering; bubbly, and streaked with impurities.

From a very large bowl. A.T. 0.0015 m.

Rim outsplayed at angle of 45° and then folded over outward and downward. Edge of rim rounded. On the upper side of rim, a band of scratched circles.

Fabric 5.

**134.** 28/159\*/T Mich. 6225.

PL. XII

Green; base fragment; no weathering; material good; few bubbles.

Dimensions roughly as no. 130. A.T. 0.004 m.

Fragment of base inside base ring only. On upper side, scratched decoration of oval facets and concentric circles.

Fabric 4 or 5.

**135.** 28/B 119 A/C.

Another base fragment with scratched decoration as on no. 134. Yellow. Fabric 5.

**136.** 27/CA 20/T1 Mich. 6217.

PL. XII

Clear green; rim fragment; no weathering; material very good, and free from bubbles.

D. 0.176 m. A.T. 0.0008 m.

Rounded rim outsplayed from outward-sloping (?) sides.

Fabric 4(?).<sup>1</sup>

**137.** 27/C 29 B/K Mich. 6169.

PL. XII

Green; fragment of rim and side; no weathering; some bubbles and impurities.

D. 0.05 m. A.T. 0.001 m.

Shape as no. 136, but thicker rim probably folded before rounding.

Fabric 4.

**138.** 28/152\*/AII.

Greenish colourless; rim fragment; no weathering.

Shape as no. 137.

Fabric 8 (?).

<sup>1</sup> The colour is that of fabric 4, but the material is so good that it seems more likely that the piece belongs to an earlier green ware, parallel in date to fabric 2.

**139.** 28/C 121 G/C Mich. 6241.

Greenish colourless; two rim fragments; milky weathering.

Shape as no. 137.

Fabric 8 (?).

**140.** 27/C 57 H/C and J/F Mich. 6205 and 6207.

Two fragments of the same bowl.

Green; fragments of rim and side; milky-pitting weathering; bubbly.

D. c. 0.21 m. A.T. 0.0015 m.

Shape as no. 137.

Fabric 5.

**141.** 25/255 B/F Mich. 6042.

Buff colourless; rim fragment; dulled, no weathering; bubbly.

Dimensions roughly as no. 140. A.T. 0.001 m.

Rim bent out sharply and rounded. Sides vertical, meeting bottom in gentle, obtuse-angled curve.

Fabric 3.<sup>1</sup>

#### IV. COIL RIM

For general remarks on coil-rim dishes and bowls see under class I A iv, p. 56 above. Of shallow bowls of the type only rim fragments have so far been found at Karanis. Almost every fragment has been listed. A complete example (Fig. 1, g),<sup>2</sup> from Philadelphia in the Fayûm, is now in the Egyptian Museum, Berlin (no. 19347). It is a bowl on base ring similar in shape to no. 130, so that it is probable that all these rims come from bowls of that type.

##### (a) MONOCHROME

###### 1. *Green*

**142.** 27/C 57 C/W Mich. 6203.

PL. XII

Thick coil at rim; no weathering; bubbly coil and rim. Fabric 8.

**143.** 26/BC 38 A/C Mich. 6146.

PL. XII

Thick coil at rim; milky in spots; very bubbly coil and rim. Fabric 8.

**144.** 27/242 B/DI (three fragments) Mich. 6156.

PL. XII

27/C 29 B/K Mich. 6169.

Fragments of the same bowl.

Thin coil, well fused in, about 0.01 m. from rim; no weathering; bubbly. Fabric 4.

<sup>1</sup> Buff colourless examples of this fabric are rare, but fragments of base rings are known of that colour. See also three examples of base rings in class III, nos. 224-6.

<sup>2</sup> Its description is as follows:

Greenish yellow with yellower coils; intact; no weathering; bubbly.

H. 0.052 m. D. 0.274 m.

Rim rounded, one thick coil near rim and five closely set, spiral coils just below. Sides concave and outsplayed, meeting bottom in obtuse angle. Bottom slopes gently downward toward base ring. True base ring, outsplayed.

Fabric 5.

145. 27/cs 60/L Mich. 6221.

Thin coil or thread about 0.01 m. from rim and faint traces of even thinner threads between that and the rim; dulled and iridescent; bubbly. Fabric 8 (?).

146. 25/5095 A/B Mich. 6075.

Three thin coils at intervals below rim; no weathering; bubbly. Fabric 8.

147. 28/B 167 E/E.

Thin coil at rim, four more thin coils lower down; highly iridescent and flaky. Fabric 4 (?).

148. 28/c 121 G/C Mich. 6241.

Thin coil at rim, three more thin coils lower down; no weathering; bubbly.

Fabric 4 (?).

## 2. *Yellowish colourless*

149. 24/5017 E/B Mich. 5809.

PL. XII

Many fragments of rim and side, but no base fragments. Sides inclined inward toward top, rim bent outward and rounded; two thin coils, close together, about 0.015 m. from rim; no weathering; material fair. Fabric 3.

## (b) BICHROME

### 1. *Colourless with bluish green coils*

150. 24/4038 D/C Mich. 5731.

Colourless with greyish tinge; thin coil about 0.01 m. from rim at a bulge in the side; no weathering; few bubbles in bowl, coil bubbly. Fabric 2 (?).

### 2. *Green with lighter green coils*

151. 24/5057 D/B Mich. 5835.

PL. XII

Double coil near rim; no weathering; bubbly. Fabric 4 or 5.

### 3. *Olive green with lighter green coils*

152. 24/4039/C Mich. 5751.

Thick coil at rim; no weathering; bubbly and many black impurities. Fabric 5.

153. 28/BS 160/N Mich. 6231.

Fragment of rim exactly as no. 152.

### 4. *Olive green with darker green coils*

154. 27/C 23 A/M Mich. 6167.

PL. XII

Thin coil at rim, another 0.01 m. lower down; no weathering; bubbly. Fabric 4 or 8.

155. 25/5072 F/K Mich. 6067.

PL. XII

One streaky coil at rim, four dark green coils at intervals below; well-advanced milky weathering; bubbly. Fabric 5.

5. *Pale yellow with pale green coils*

156. 26/B 26 F/N Mich. 6123. PL. XII  
Thick coil, streaked with blue, at rim; frosted; bubbly. Fabric 3 (?).

6. *Yellow with green coils*

157. 27/241 C/Q Mich. 6155. PL. XII  
Two coils close together about 0.01 m. from rim; no weathering; bubbly. Fabric 4 (?).

158. 28/C 121 G/C Mich. 6241.  
Thin coil at rim and two others lower down; dulled; few bubbles. Fabric 4.

159. 27/237 A/O Mich. 6154. PL. XII  
Sides slightly outspayed with two concavities and coil at bulge between, about 0.005 m. from rim; no weathering; bubbly bowl with very bubbly coil. Fabric 4.

160. 27/C 54 G/C Mich. 6194. PL. XII  
Yellow bowl streaked with purple; two thin threads near rim, two thicker ones lower down; frosted; bubbles. Fabric 4 or 5.

7. *Purplish colourless with greenish colourless coils*

161. 26/B 36 A/F Mich. 6131.  
Streaky bowl; thick coil at rim; no weathering; bowl free from bubbles, bubbly coil. Fabric 6.

162. 28/131\*/F.  
Fragment of rim as no. 161 exactly.

8. *Purple with almost colourless coils*

163. 25/4011/L Mich. 6059. PL. XII  
Thick coil at rim; no weathering; bubbly. Fabric 6.

9. *Yellowish purple with almost colourless coils*

164. 25/5083 B/AI Mich. 5687. PL. XII  
Streaky bowl; thin coil at rim, four more at intervals lower down; no weathering; few bubbles in bowl, bubbly coils. Fabric 6.

165. 28/C 121 G/C Mich. 6241.  
Streaky bowl; six coils at intervals down side; patches of milky weathering; bubbly. Fabric 6.

## V. MOULDED OR POLISHED RIM

No examples with plain polished rims have been found yet at Karanis, but mention should be made of two fine bowls of the type from elsewhere in Egypt, which are identical in shape and fabric one with the other. The one comes from Philadelphia in the Fayûm and is now in the Egyptian Museum, Berlin (no. 19348, H. 0.055 m. D. 0.365 m.) (Fig. 1, j); the other is of uncertain provenance and is

now in the Egyptian section of the Louvre (Inv. no. 977, H. 0.047 m. D. 0.35 m.).<sup>1</sup>

At Karanis two types of moulded-rim bowls occur:

- (a) With overhang at edge;
- (b) Without overhang.

These correspond to the two types of circular plate with moulded rim, I B i and ii, pp. 60-1 above.<sup>2</sup>

(a) SHARPLY OFFSET RIM WITH OVERHANG AT EDGE

No complete examples were found; all known fragments are listed.

**166.** 26/B 2 AB/G Mich. 6083.

PL. XII

Colourless with strong green tinge in thicker parts; one fragment of rim, one fragment of side and base, giving complete restoration except for centre of base; dulled, no weathering; material rather poor; many bubbles and specks of impurities.

H. 0.044 m. D. 0.192 m. A.T. 0.002 m.

Broad rim, sharply offset from side, with thickened overhang at edge. Sides straight outsplayed, sloping inward to a curved junction with bottom just outside base ring. Base slightly convex. True base ring, high and outsplayed.<sup>3</sup> The bowl shows marks of rotatory polishing.

Fabric 1.

**167.** 24/4037 c/t Mich. 5850.

Colourless with green tinge in fracture; two fragments, about one-third of bowl; iridescent in parts, rest of surface dulled; material good; some bubbles.

D. c. 0.105 m. A.T. 0.002 m.

Shape and technique as no. 166.

Fabric 1.

**168.** 25/181/D Mich. 6024.

Colourless with strong green tinge; fragment of rim; dulled, no weathering; material good; few bubbles and no impurities.

D. c. 0.24 m. A.T. 0.003 m.

Shape and technique as no. 166.

Fabric 1.

<sup>1</sup> The description of these pieces is as follows:

Colourless with greyish tinge; rim polished in convex section, with horizontal wheel cut on inside of bowl just below. Sides outsplayed, forming obtuse-angled junction with bottom; bottom slopes slightly downward toward base ring. True base ring, outsplayed.

The Berlin example has two concentric wheel-cut circles on base, inside: these are lacking on the Louvre piece, but the central incised circle characteristic of this ware appears on both; see n. 2, p. 61 above.

<sup>2</sup> On the technique of these pieces see n. 1, p. 60 above.

<sup>3</sup> The centre of the base is lost, so that it is uncertain whether it had on its upper side the incised circle made by the polishing wheel; see n. 2, p. 61 above.

## (b) SHARPLY OFFSET RIM WITH NO OVERHANG AT EDGE

Several fragments occurred but only one complete example, which is very much smaller than any of the fragmentary specimens; all known fragments are listed.

**169.** 27/B 118 M/O Mich. 5971.

PLS. II and XII

Colourless with greenish tinge; chipped on rim; usage scratches, no weathering; material good; some pin-prick bubbles.

H. 0.025 m. D. 0.052 m. A.T. 0.004 m.

Rim offset horizontally with slight concavity outside at the junction of side and rim. Upper side of rim concave, under side flat. Lip rounded. Sides straight-outsplayed and rising direct from base ring. Base flat. True base ring, slightly outsplayed. There are no fashioning marks visible, but the surface shows marks of rotatory polishing.<sup>1</sup>

Fabric 1.

**170.** 26/B 30 B/D Mich. 6129.

PL. XII

Colourless with strong green tinge; one fragment, giving complete restoration except for centre of base; no dulling but some specks of milky weathering; material fair, but full of pin-prick bubbles and specks of black impurities.

H. 0.04 m. D. 0.118 m. A.T. base 0.002 m. A.T. side 0.004 m.

Shape and technique as no. 169. Rim sharply cut, the larger bowl allowing greater precision of work. The sides and rim have a much greater average thickness than the base and the base ring.

Fabric 1.

**171.** 26/B 26 F/N Mich. 6123.

PL. XII

Colourless with faint greenish tinge; seven fragments, including most of centre of base and part of rim and side; frosted and some spots of milky weathering; material good; a few pin-prick bubbles and impurities.

H. c. 0.05-0.06 m. D. c. 0.21 m. A.T. 0.003 m.

Shape and technique as no. 169. In the centre of the base, on the upper side, there are two concentric stamped circles, D. 0.026 m. and 0.023 m., and inside them is a much smaller incised circle, D. 0.004 m.<sup>2</sup>

Fabric 1.

**172.** 25/237 G/B Mich. 6033.

Greenish; fragment of rim; no weathering; very bubbly and many specks of impurities.

D. c. 0.175 m. A.T. 0.002 m.

Shape and technique as no. 169.

Fabric 1 or 3.<sup>3</sup>

<sup>1</sup> There is here no incised circle in the centre of the base. That it is absent in this example, and in this example only, is strange. Possibly the bowl is so small that the polishing was not done on a wheel.

<sup>2</sup> The two larger circles are certainly stamped or impressed and not incised, and are probably decorative only. The smaller circle is the mark of the polishing wheel mentioned in n. 2, p. 61 above.

<sup>3</sup> This is probably a late example. The glass is no longer colourless or reasonably free from bubbles.

The following fragments of base rings almost certainly belong to this class and type:

**173.** 26/B 2 P/A Mich. 6080.

PL. XII

Colourless with greenish tinge; about one quarter of base; frosted; material good. D. base ring 0.22 m. A.T. inside base ring 0.004 m. A.T. outside base ring 0.002 m. Shape and technique as no. 169. Two concentric stamped circles in the centre of the base on the upper side, D. 0.032 m. and 0.027 m. Within these circles a small knob with noticeable polishing marks in the hollow outside it.<sup>1</sup>

Fabric 1.

**174.** 24/5060 A/G Mich. 5823.

A fragment of an equally large base ring, exactly as no. 173.

**175.** 24/5054 B/B Mich. 5790.

A fragment of a base ring, as no. 173, but greener glass, and frosted.<sup>2</sup>

**176.** 26/B 8 C/K Mich. 6100.

PL. XII

Colourless with greenish tinge, traces of a design in red paint; fragment of base ring; frosted; material good.

D. base ring 0.11 m. A.T. 0.002 m.

Fragment of a large bowl which has been chipped or cut off just outside the base ring. Probably the bowl was first broken accidentally and then chipped off evenly so that the base might be used again independently. Inside the base ring, on the under side, are faint traces of a painted floral design, consisting of a red background with a line pattern in black.<sup>3</sup>

Fabric 1.

**177.** 28/B 167 A/R Mich. 6232.

Three fragments of a base ring as no. 176, showing the same kind of chipping just outside the ring.<sup>4</sup>

**178.** 26/B 17 F/N Cairo J 52769-70.

PL. XII

Colourless with greenish tinge; two contiguous fragments, part of base and ring only; frosted; no bubbles.

From a large bowl. A.T. 0.003 m.

Shape and technique as no. 173. The bowl was decorated inside with millefiori inlay in mosaic technique. The whole pattern cannot now be identified, but the fragment that remains shows three curving lines of inlay made up of alternating squares of different patterns:

- (a) Squares of four white circlets on a transparent sky blue ground, alternating with squares of opaque red with a yellow central circle.
- (b) Squares of four yellow circlets on a transparent green ground, alternating with squares of white opaque petals with a yellow centre.
- (c) As for (a).

<sup>1</sup> The stamped circles correspond to those on no. 171, and the small knob corresponds to the incised circle on that vase; see n. 2, p. 84.

<sup>2</sup> This example shows parts of its two concentric stamped circles.

<sup>3</sup> It is impossible to tell whether the design was added when the bowl was whole or after it had been broken.

<sup>4</sup> This would therefore seem to have been a common method of adapting broken bowls, and shows the value attached to this fine type of glassware.

Each piece of the mosaic is about 0.001 m. thick and set flush with the surrounding glass. The bowl was polished after the inlay was in place, and the polishing marks are distinct on both sides. An excellent piece of glass-working.  
Fabric 1 or 2.

## B. WITH ROUNDED BASE

### I. PLAIN RIM, ROUNDED OR POLISHED

#### (a) WHEEL-CUT PATTERN

Only fragmentary specimens were found; all are listed.

**179.** 26/B 7 L/F Cairo J 52763. PL. XIII

Colourless with greenish tinge in fracture; about one-quarter of rim and side; very slight iridescence; material good and clear, but some bubbles and impurities.

D. c. 0.20 m. H. 0.045 m. A.T. 0.003 m.

Rim rounded and afterwards polished to a sharp angle on inside. Rounded base from which sides rise in unbroken curve to rim. On exterior a cut design of straight and curved grooves and oval facets, in panels. Each quarter of the bowl seems to have had a large centre panel flanked by two smaller ones, and the pattern probably extended over the whole under side of the bowl, as it does on the following examples.

Fabric 2.

**180.** 26/B 7 L/F Mich. 6098. | PL. XIII  
26/B 8 c/k Mich. 6100. |

Colourless with greenish tinge; two contiguous fragments of the rim and side; the fragment from B 7 L has traces of iridescence, the one from B 8 c has spots of milky weathering; material rather poor for this ware; bubbly and some black impurities.

H. 0.03 m. D. c. 0.17 m. A.T. 0.002 m.

Rim rounded. Sides rise in unbroken curve to rim. On the sides a frieze of cut decoration composed of faintly S-shaped godroons flanked by grooves. On the bottom are traces of a cut design enclosed by a cut circle.

Fabric 2.

**181.** 27/C 55 A/TII Mich. 6195.

PL. XIII

Colourless with faint greenish tinge; small fragment of side and base; traces of frosting; material good and clear with no bubbles.

Dimensions roughly as no. 180. A.T. 0.002 m.

Shape as no. 180. On the exterior, cut decoration in two divisions; (a) a frieze on the sides comprised of long oval facets flanked by grooves, and (b) within this frieze, a circular design of floral (?) pattern. The circular design (b) is bordered and divided from (a) by four concentric wheel-cut circles.

Fabric 2.

**182.** 25/5048/L Mich. 6064.

PL. XIII

Colourless with greyish green tinge; about half of base in many fragments; frosted on both sides, many strain cracks; material fair.

D. of central decoration 0.058 m. A.T. 0.002 m.

Shape as no. 180. Cut design on exterior consisting of (a), a frieze of geometrical

patterns in facets and (b), a central circular design depicting an animal (?) or a bird (?). Between (a) and (b) are two concentric wheel-cut circles.

Fabric 2.

**183.** 26/BS 1/J Mich. 6149.

PL. XIII

Colourless with greenish tinge; two fragments of base; dulled, with traces of iridescence; material good and clear; some pin-prick bubbles.

D. of central decoration 0.094 m. A.T. 0.004 m.

Shape as no. 180. Cut design on exterior consisting of (a), a frieze of geometrical pattern in facets and (b), a central circular design depicting a dolphin (?). Between (a) and (b) are two concentric wheel-cut circles.

Fabric 2.

**184.** 25/245/p Mich. 6037.

PL. XIII

Colourless with greenish tinge; fragment of side and base; no weathering; material good; a few pin-prick bubbles.

D. of central decoration roughly as no. 183. A.T. side 0.002 m. A.T. bottom 0.004 m.

Shape as no. 180. Cut design on exterior consisting of (a), a frieze of floral (?) pattern and (b), a central circular design of animal or floral pattern. Between (a) and (b) are two concentric wheel-cut circles.

Fabric 2.

**185.** 25/5026 B/M Mich. 6062.

PL. XIII

Colourless with faint greenish tinge; part of side and base in many fragments; frosted and badly strain-cracked; material good; no bubbles.

D. of central decoration larger than no. 183. A.T. of side 0.002 m. A.T. base 0.005 m.

Shape as no. 180, but here the two concentric circles bordering the central design are above the junction of the bottom and sides. Cut design on exterior consisting of a circular floral (?) pattern surrounded by two concentric wheel-cut circles. Not enough of the side remains to show whether there was a frieze outside this central design.

Fabric 2.

**186.** 26/B 8 D/Q Cairo J 52773.

PL. XIII

Colourless with greenish tinge; part of side and base; one spot of iridescence and one spot of milky weathering; material good; some pin-prick bubbles.

D. of central decoration c. 0.09 m. A.T. 0.003 m.

Shape as no. 180. Cut design on exterior consisting of a frieze and a central circle both made up of geometrical patterns of grooves and facets. The two parts of the design are divided by three concentric wheel-cut circles.

Fabric 2.

**187.** 25/276 A/G Mich. 6046.

PL. XIII

Colourless with greenish tinge; fragment of side; no weathering; material good; a few bubbles.

Dimensions doubtful. A.T. 0.0015 m.

Shape as no. 180. Cut design on exterior consisting of a continuous frieze of floral (?) pattern.

Fabric 2.

188. 26/B 12 L/G Mich. 6111.

PL. XIII

Colourless with greenish tinge; fragment of side; no weathering; material good; a few pin-prick bubbles.

Dimensions doubtful. A.T. 0.002 m.

Shape as no. 180. Cut design on exterior consisting of cut facets and scratched circlets. Complete pattern doubtful.

Fabric 2.

189. 24/4034 A/AE Mich. 5883.

PL. XIII

Colourless with greenish tinge; two fragments of base; frosted and spots of milky weathering; material good; some pin-prick bubbles.

From a large bowl. A.T. 0.003 m.

Shape as no. 180. Cut design on exterior consisting of a central circular pattern of round and oval facets surrounded by four concentric wheel-cut circles.<sup>1</sup> Traces of a geometrical frieze on side.

Fabric 2.

190. 28/CS 100/01 Cairo J 54769.

PL. XIII

Colourless with greenish tinge; fragment of base; frosted; material fair.

From a large bowl. T. at centre 0.0035 m. T. at side 0.001 m.

Shape as no. 180. Cut design on exterior consisting of a pattern of oval facets with scratched shading surrounded by one wheel-cut circle. Design indistinguishable.

Fabric 2.

### (b) MILLEFIORI INLAY PATTERN (ON INTERIOR)<sup>2</sup>

Only two fragmentary specimens occurred.<sup>3</sup>

191. 25/5048/LI Mich. 6064.

PL. XIII

Colourless with greenish tinge; fragment of rim and side; slightly frosted; no bubbles, but some brown, sandy impurities.

From a large bowl. A.T. 0.003 m.

Polished rim, with a sharp edge outside and a rounded edge inside. Sides outsplayed, forming a continuous curve with bottom. On exterior, c. 0.01 m. from rim, a horizontal wheel cut. On interior, apparently originally covering the whole of the centre portion of the bowl, there is an inlaid design of coloured and millefiori glass, forming a floral pattern. On the extant fragment this consists of a floral stem of opaque green and a square of purple millefiori enclosing four circlets of white with red centres. Each piece of inlay is about 0.001 m. thick, and is set flush with the surface of the bowl, the whole surface having been polished after the inlay was in position. Polishing marks visible.

Fabric 2.

<sup>1</sup> For the pattern compare the colourless shallow bowl from Gelsdorf, p. 68 above.

<sup>2</sup> Two small deep bowls in the Louvre (Coll. Campana, nos. 48-9) show this same technique. They are of greenish colourless glass with plain polished rims, hemispherical body, and slightly flattened base. On the interior is an inlaid decoration of pendent stripes, but in this case the millefiori squares are of the bichrome spiral type; compare also the base fragment, no. 178.

<sup>3</sup> The two fragments are so similar in shape, technique, and decoration that on internal evidence they might come from the same bowl. There is, however, no actual junction, and in the absence of such, and seeing that they were found in different years and in different parts of the Kôm, it seems improbable that they should be connected.

192. 27/CA 20/GI Cairo J 52771. PL. XIII  
 Colourless with greenish tinge; fragment of side and base; no weathering; material as no. 191.

From a large bowl. A.T. 0.003 m.

Fragment of a bowl like no. 191.<sup>1</sup> In the top right-hand corner there is a millefiori square of purple in which are white circlets with red centres, and on either side of this are fragments of green leaves: all exactly as on no. 191. At the bottom, left, a fragment of a green square with a yellow circlet, and across the fragment a stalk comprised of strips of yellow, blue, and red glass. The inlay is flush with the surface and the whole is polished, as on no. 191.

Fabric 2.

(c) MILLEFIORI FABRIC

The following fragments of millefiori, or multicoloured, glass bowls have been found. None of them is large enough to show the shape of the bowl to which it belonged. They are all, therefore, grouped together here, though it is likely that some at least of them belong to base-ring bowls. All known fragments are listed.

1. *Designs extending through the whole thickness of the glass*

193. 26/B 9 K/H Mich. 6103. PL. XIII  
 Fragment of rim of large moulded bowl. No settled pattern: basis of design, cuttings from a rod made up of yellow circlets with red centres on a background of green.

194. 26/B 12 L/G Cairo J 52775 and Mich. 6111. PL. XIII  
 One rim fragment (Cairo) and one side fragment (Mich.), not contiguous, of a large moulded bowl. No settled pattern: basis of design, cuttings from a rod made up of yellow circlets with red centres on a background of green, alternating with cuttings from a rod of yellow and green; some purplish brown glass besides.

195. 24/5000/H Mich. 5765.  
 Fragment of rim of bowl with pattern as for no. 194. Horizontal wheel cut on outside near rim.

196. 28/C 62 N/L Mich. 6244. PL. XIII  
 Fragment of bottom (?) of a moulded bowl with two concentric wheel cuts on outside.  
 No settled pattern: basis of design, cuttings from a rod with a blue centre and red petals on a background of green with yellow spots.

197. 24/4030 E/M Mich. 5658.  
 Fragment of rim of bowl with pattern as for no. 196.

198. 28/C 111 A/L.  
 Fragment of bottom (?) of a moulded bowl with two concentric wheel cuts on outside. Dark green glass with circlets of opaque yellow.

199. 24/165 A/B Mich. 5888.  
 24/5048/AQ Mich. 5827.  
 Fragments of two other bowls with pattern as for no. 198.

<sup>1</sup> See n. 3, p. 88.

**200.** 28/B 167 A/s Mich. 6243. PL. XIII  
 Fragment of rim of moulded bowl. Blue glass with opaque white spots in a speckled pattern.

**201.** 26/B 3 N/K Mich. 6087. PL. XIII  
 Fragment of side of moulded bowl. On a clear blue background a series of cuttings from rods with a cross-fleuri pattern; yellow arms, with florate ends of green, white, and red (reading outward).

*2. Designs inlaid on interior of bowl*

**202.** 26/B 36 C/G Mich. 6132. PL. XIII  
 Fragment of bottom (?) of moulded bowl of opaque dark blue glass. Inlaid design on interior polished flush with the surface of the bowl. T. of bowl 0.004 m. T. of inlay 0.0015 m. Design: fragmentary bird's head in light blue with a purple crown and a green eye round which are first a yellow and then a red circle; in the field, fragments of stalks or foliage in opaque green.

**203.** 28/B 119 C/K Mich. 6242. PL. XIII  
 Fragment of bottom (?) of moulded bowl of opaque dark blue glass. Inlaid design on interior, polished flush with the surface of the bowl. T. of bowl 0.0045 m. T. of inlay 0.002 m. Design: a green leaf (?) with yellow veins.

*(d) WITH MARVERED-IN FESTOONS<sup>1</sup>*

Only one fragmentary example occurred.

**204.** 26/BS 1/J Mich. 6149. PL. XIII  
 Greenish colourless; fragment of side and base; frosted; some bubbles.  
 From a medium-sized bowl. A.T. 0.0015 m.  
 Rim missing. Side and bottom in unbroken curve. On exterior of base festoons of opaque white threads marvered in flush with the surface of the bowl before blowing and then blown with it. Outside this pattern, a horizontal group of wheel incisions.  
 Fabric 3 (?).

*II. POLISHED RIM, WITH CONSTRICKION IN THE  
 SIDE JUST BELOW*

*(a) CUT OR INCISED DECORATION*

Only fragmentary examples occurred; all are listed.

**205.** 26/B 9 R/W Mich. 6106. PL. XIII  
 Colourless with greenish tinge; fragment of rim and side; frosted; material good, except for one large bubble.  
 From a medium-sized bowl. A.T. 0.002 m.  
 Rim cut off square and polished. Constriction in side just below rim, from which side bulges to its greatest diameter. Rounded base, joining side in unbroken

<sup>1</sup> For a similar pattern compare some fragments of lamps, p. 166 below.

curve. Group of horizontal wheel incisions near rim, and another at greatest diameter. Below these, a fragmentary oval facet, the only trace remaining of the central design.

Fabric 2.

**206.** 26/B 12 L/G Mich. 6111.

PL. XIII

Colourless with greenish tinge in fracture; fragment of rim and side; frosted; material good.

D. c. 0.12 m. A.T. 0.002 m.

Shape as no. 205, but a deeper constriction in side near rim. Two horizontal wheel cuts just below rim, and a third just above greatest diameter. No trace of facets.

Fabric 2.

**207.** 26/B 27 A/Q Mich. 6124.

Colourless with greenish tinge at fracture; fragment of rim and side; frosted; material good.

D. c. 0.12 m. A.T. 0.0015 m.

Shape as no. 205, but less bulging sides. One horizontal wheel cut just below rim and two more wheel cuts just above greatest diameter. No trace of facets.

Fabric 2.

**208.** 26/B 2 H/YI Mich. 6078.

Colourless with greenish tinge; fragment of rim and side; spotty, milky weathering all over surface; some pin-prick bubbles.

D. c. 0.17 m. A.T. 0.001 m.

Shape as no. 205, but a larger and shallower bowl. One horizontal wheel cut near rim; no further decoration.

Fabric 2.

**209.** 24/139 B/R Mich. 5848.

PL. XIII

Colourless with greenish tinge; fragment of rim and side; no weathering; many pin-prick bubbles.

D. 0.144 m. A.T. 0.0025 m.

Shape as no. 205. One horizontal wheel cut just below constriction, and two concentric wheel cuts on base. No further decoration.

Fabric 2.

**210.** 26/B 8 D/Q Mich. 6101.

PL. XIII

Colourless with greenish tinge; fragment of rim and side; usage stains, no weathering; material good, but some pin-prick bubbles.

D. c. 0.17 m. A.T. 0.0015 m.

Shape as no. 205. One horizontal wheel cut on exterior near rim, and below that a fish-bone pattern of oval facets. Below again, a series of wheel incisions enclosing a central design, only a fragment of which is preserved.

Fabric 2.

**211.** 26/B 30 B/D Mich. 6129.

PL. XIII

Colourless with greenish tinge; fragment of rim and side; frosted on fractures and patches of milky weathering besides; (?) traces of iridescence also; material good; few bubbles.

D. 0.14 m. A.T. 0.002 m.

Shape as no. 205. One horizontal wheel cut on exterior near rim, and another at

greatest diameter. Below, a design of oval facets in quincunx formation, comprising part of the central pattern.

Fabric 2.

**212.** 25/286 B/L Mich. 6051.

PL. XIII

Colourless with greenish tinge; fragment of rim and side; traces of iridescence; material as no. 211.

D. 0.15 m. A.T. 0.002 m.

Shape as no. 205. One horizontal wheel cut on exterior just below rim, and another just below greatest diameter. Below latter, fragments of the edge of a central design of cut facets and incisions.

Fabric 2.

**213.** 24/130 C/P Mich. 5400.

PL. XIII

Colourless with greenish tinge in fracture; fragment of rim and side; frosted; material good.

D. 0.18 m. A.T. 0.002 m.

Shape as no. 205. Two horizontal wheel cuts on exterior just below rim, and another at constriction. Below latter a fragmentary pattern of wheel cuts and incisions.

Fabric 2.

**214.** 24/5028 C/C Mich. 5802.

Colourless with greenish tinge in fracture; fragment of rim and side; frosted; material fair.

From a medium-sized bowl. A.T. 0.003 m.

Shape as no. 205. Two horizontal wheel cuts on exterior just below rim, and another at greatest diameter. Between these a single line of oval facets set horizontally.

Fabric 2.

### (b) RAISED VERTICAL RIBS

Only one fragmentary bowl and a base fragment of another occurred; they were found together.

**215.** 26/B 30 B/D Cairo J 52772 and Mich. 6129.

PL. XIII

Colourless with greenish tinge; about half the bowl in six fragments, but not all contiguous; spotty, milky weathering, especially on one fragment;<sup>1</sup> bubbly.

H. 0.042 m. D. 0.098 m. A.T. 0.002 m.

Rim cut and polished. Sides constrict just below rim, and from there bulge to greatest diameter half-way down. Sides and bottom meet in unbroken curve. Base rounded, with flattening in centre. At rim, a set of horizontal wheel incisions. Below constriction, two more sets. On base, two further sets, forming a double concentric circle. Between the last two groups a band of raised vertical ridges furrowed out from the body of the glass, but neither symmetrically placed nor absolutely straight. Their ends are connected at the bottom, forming a rough U-shape.

Late fabric 2.

The other fragment is from a similar bowl, but larger.

Greener and more bubbly glass. Fabric 8 (?).

<sup>1</sup> Yet this weathered fragment forms a join with another quite unweathered one—an instance of the varying effect of environment on weathering; see p. 11.

## (c) MOULDED DECORATION ON EXTERIOR

Only three fragments of the rounded bases of such bowls occurred, but the type of the first is attested by a fragment<sup>1</sup> in the Antiquarium, Berlin (no. 30638, Roman room) from Elephantine, Upper Egypt, which preserves the complete section of a bowl with exactly similar decoration (Fig. 1, f). The other two pieces, though differing in decoration, obviously belong to the same type.

**216.** 27/c 29 c/EI Mich. 6021.

PL. XIII

Green; fragment of base; no weathering; bubbly.

W. of fragment 0.055 m. A.T. 0.004 m.

Fragment of rounded base of bowl. Interior plain, mould-blown pattern on exterior: raised lines crossing and forming squares, within each of which are two concentric circles with a large knob in the centre, and in each of the angles of the squares a smaller knob; in the sunken parts of the design are traces of a brown substance, perhaps paint.<sup>2</sup>

Perhaps fabric 5.

**217.** 26/BS 1/J Mich. 6022.

PL. XIII

Yellowish green, with purple inlay; fragment of base; no weathering; some pin-prick bubbles.

W. of fragment 0.05 m. A.T. 0.003 m.

Fragment of base as no. 216: mould-blown pattern of raised hexagons in quincunx formation, in the centre of each of which is inlaid a section of purple glass cut from a rod: the inlays were pressed, when cold, into the surface of the bowl while it was still warm.<sup>3</sup>

Perhaps fabric 5.

<sup>1</sup> Its description is as follows:

Olive green; fragment of rim, side, and base; no weathering; pin-prick bubbles.

L. from tip to tip 0.12 m. Side of square 0.037 m.

Polished rim, bent slightly inward. Sides convex, base almost flat. Rim plain for about 0.02 m.; below, on sides and base, a moulded design. Outside, a frieze of vertical raised ribs; within this circle a chequer pattern of squares, each enclosing two concentric circles and a central knob; within the angles of each square are four raised knobs, and a fifth knob is at the tip of each angle where the lines cross. No traces of the brown paint (?) on this example.

Fabric 5 (?).

A fragment of a bowl of yellowish glass, of the same type, may be seen in the Kaiser Friedrich Museum, Arabic Section (no. 05. 93). The moulded design is, however, different. Within a frieze of vertical ribs, as before, there is a central pattern consisting of equal circles separated, angularly, by small crosses: within each circle is a radiate design outside a smaller circle enclosing a central knob.

<sup>2</sup> For another example of a similar pattern, also with brown paint (?) in the hollows, see class XIV N (uncertain fragments), no. 999.

<sup>3</sup> For this 'cold-inlay' technique compare a jug of dark blue glass in the Maison Carrée at Nîmes on which are inset pieces cut from a rod of white opaque glass. Compare also a beaker of green glass in Nîmes (Musée Archéologique) with two horizontal rows of insets cut from a blue rod. In the latter piece one of the insets has run during the reheating process and become a blob.

**218.** 27/C 45 K/Y Cairo J 52774.

Yellowish green with millefiori inlay; fragment of base; no weathering; a few bubbles.

W. of fragment 0.04 m. A.T. 0.0035 m.

Fragment of base, shape and decoration as no. 217, but the inlays are this time sections of a millefiori rod made up of a blue centre surrounded by a red circle outside which is another circle, yellow with green radiate stripes. In the hollows of the hexagons are slight traces of the same brown paint (?) as appear on no. 216. Perhaps fabric 5.

### III. VARIANT TYPES OF RIM

Here should be noticed two fragments of rims of types as yet unknown in complete specimens, but which probably belong to bowls with rounded bases.

**219.** 25/5048/LI Mich. 6064.

PL. XIII

Colourless with greenish tinge; fragment of rim and side; frosted; material good; a few bubbles.

From a large bowl. A.T. 0.002 m.

Rim folded solid, outward and downward, leaving a sharp edge on top and a rounded beading on outside. Horizontal coil on exterior, 0.01 m. from rim. Sides well outsplayed. Rounded base, joining sides in unbroken curve.

Fabric 2.

**220.** 27/242 B/DI Mich. 6156.

PL. XIII

Colourless with greenish tinge; fragment of rim; no weathering; material good; some bubbles.

From a large bowl. A.T. 0.0008 m.

Rim well outsplayed and polished in convex section after edge was thickened by folding. In hollow underneath rim a trailed-on horizontal thread.

Fabric 2.

## CLASS III

### DEEP BOWLS

THE deep bowl, class III, is not so common, at least as regards complete specimens,<sup>1</sup> as the shallow bowl, class II. The two classes are usually distinct, except in the case of bowls with rounded bases, and it is seldom difficult to determine to which of the two a particular specimen should be ascribed.

The class is divided on the same principles as were used in the previous one. There are two main groups:

- A. With base ring;
- B. With rounded base.

A third group, C, contains fragments of coil-base bowls, and there is a fourth group of bowls on flat or concave bases without rings, which contains only three fragmentary specimens and is, so far as Egyptian glass is concerned, probably a freak type.<sup>2</sup> In a fifth group, E, are placed some rim fragments whose complete shapes are uncertain.<sup>3</sup>

Further subdivisions are based primarily on rim technique and secondarily on other differences of technique, decoration, or fabric. All the complete specimens discovered belong to group A.

Amongst the base-ring bowls of group A will be found parallels to most of the types of shallow bowl with base ring, class II A. The shapes are not always similar, but the same techniques and fabrics are represented in both classes, except that in class III there are more bowls with inward-folded rim and a new type of mould-pressed (?) bowl with plain polished rim occurs in division v.<sup>4</sup>

The first four divisions of the group include both early and late pieces. Early types include the bowls with pushed-in base ring of divisions ii (c) and iii (c) 1, which belong to fabric 2 or fabric 8, and perhaps also some of the coil-rim fragments in division iv. These are, seemingly, the prototypes of the rest of the bowls in

<sup>1</sup> There are thirty-three complete shallow bowls in this collection and only eighteen complete deep bowls.

<sup>2</sup> Yet the deep bowl with flat or concave base is quite common elsewhere; see p. 104.

<sup>3</sup> Some of these may belong to class II.

<sup>4</sup> Outside Egypt shallow bowls of this type, probably of Egyptian manufacture, have been found; see p. 66 f.

these divisions, just as their counterparts in class II were the prototypes of other shapes in their class. All of them were found either in the B-period houses of 1926 or in other early houses, so that, like their class II counterparts, they should be dated to the second or third century. The rest, including all the examples in divisions i (a) and (b), ii (a), and iii (a), belonging to fabric 3, 4, or 5, are probably not pre-Constantinian. The earliest houses in which they are found are the 5000 houses of 1924 and 1925 and the C-period houses of 1927 and 1928, and fragments of them are numerous in all the latest houses on the site. These types, like their counterparts in classes I and II, were long in vogue and represent the table ware of the late third, of the fourth, and of the fifth centuries.

The fragments of mould-pressed (?) bowls with polished rims of division V belong, apparently, to fabric I. Despite the fact that the most complete specimen was found in the top layer,<sup>1</sup> they must by all analogy be early pieces, being parallel in fabric and technique to the plates and shallow bowls with moulded rims (I B i and ii, and II A v), and the central date of their manufacture cannot be placed later than c. 150.

Of these base-ring bowls only those with folded or rounded rims can be paralleled from other finds in Egypt. Edgar publishes eighteen<sup>2</sup> and Wainwright eight<sup>3</sup> examples of folded-rim bowls with true base rings or with pad bases, the ordinary late type; ten more examples from Karanis are in Cairo, acquired after the publication of Edgar's catalogue,<sup>4</sup> and ten are in the Askren collection.<sup>5</sup> There are three examples in the British Museum,<sup>6</sup> two in the Victoria and Albert Museum,<sup>7</sup> two in Toronto,<sup>8</sup> four in Boston,<sup>9</sup> and others in Brooklyn<sup>10</sup> and in the Kaiser Friedrich Museum, Coptic Section.<sup>11</sup> Of rounded-rim bowls of the late, coloured variety,

<sup>1</sup> It was, no doubt, preserved throughout several generations as a treasured possession.

<sup>2</sup> Edgar, *Cat.*, nos. 32433-42, 32446-9, 32452, 32455, and 32778-9 (both from Karanis).

<sup>3</sup> Wainwright, type 8, nos. J 47092 g, 47094 d, 47097 j, 47099 g, h, and 47105 h, i, j, pp. 80-3, pl. xxxvii.

<sup>4</sup> Nos. J 43807-8, 45774, 46440, 46444-7, 46451 (for these see App., p. 311), and 47264 (Wainwright, *Annales*, xxiv, 116).

<sup>5</sup> Mich. 5016-25; see App., p. 319.

<sup>6</sup> Two are green, fabric 3, rim folded outward, bought in 1891; the third is yellow, fabric 4, from the Fayûm.

<sup>7</sup> Beck loan, no. 623, and 339, 1900 (Myers collection).

<sup>8</sup> No. g 1928, and another, both of type i (b).

<sup>9</sup> Nos. 13.4291-92 (i (a)), 13.4294, and 13.4298 (i (b)).

<sup>10</sup> Wilbour collection; part of a hoard found in a jar at Edfu, 1885; see also pp. 97 and 128-9 below.

<sup>11</sup> Wulff, no. 1204 (not illustrated).

division iii (a), Edgar, strangely enough, lists no examples, though numerous specimens acquired since the publication of Edgar's catalogue exist in the Cairo Museum,<sup>1</sup> and two examples are in the Askren collection.<sup>2</sup> Wainwright published five examples<sup>3</sup> and there are five more in Brooklyn,<sup>4</sup> and rim fragments of the type from Koptos may be seen in the Musée Guimet at Lyons.

Three parallels to the type with scalloped rim may be quoted: a bowl in the Louvre, MND 1123, of yellowish brown glass, which comes from the neighbourhood of Kerch, and two bowls of green glass in Toledo (Fig. 2, g), both of which were found in Syria; all three are probably Egyptian in origin (p. 111 f.). This type, once more, is perhaps a copy of metal-work, for there is a silver bowl of this identical shape in the Antiquarium, Berlin (Inv. der Misc. 10175), which comes from Karnak, Egypt. A new type, with rounded rim and cut-out just below, is represented by one specimen in Cairo from Karanis found by *sebbakhîn* in 1916 (no. J 45774; see App., p. 312). In shape it is nearly akin to the stemmed variety, no. 358, type IV B.

Of the earlier, colourless type with tubular base ring only two examples have been published elsewhere, one in Edgar's catalogue<sup>5</sup> and one by Woolley and MacIver.<sup>6</sup>

Not a single instance of a coil rim or polished rim can be traced in museums or publications.

Outside Egypt this shape cannot be said to have been as common as the bowl with rounded base, though amongst the examples that occur variations in shape and technique are manifold. In Morin-Jean's list of forms no less than eight variants are given, nos. 81-8; and Kisa illustrates even more on his Formentafeln F and G, e.g., nos. 354, 370, 372, 411, 415-20 (some of these evidently Egyptian and taken from Edgar), and 434.

Perhaps the commonest variety is the bowl with pushed-in base ring (tubular or otherwise), and curved sides ending in a folded or rounded rim, that is, a bowl of the general type of Morin-Jean's form 86. This shape, which lasted with slight modifications throughout the Roman period, is found both in Syria and on western

<sup>1</sup> Including, from Karanis, nos. J 37933 a, b, 46439, 46441-3, 46448-50, and 46452-3; see App., p. 312.

<sup>2</sup> Mich. 5026-7; see App., p. 319.

<sup>3</sup> Wainwright, type 7, nos. J 47097 g, h, i, 47099 f, and 47105 g, pp. 80-3, pl. xxxvii.

<sup>4</sup> See note 10, p. 96 above.

<sup>5</sup> Edgar, *Cat.*, no. 32462.

<sup>6</sup> Woolley and MacIver, *Karanîg*, p. 73, pl. 39; now no. 7349 in Philadelphia.

sites, and corresponds to the fragments listed under A ii (c) and iii (c). Examples may be seen in most museums.<sup>1</sup>

Other interesting types, so far not found in Egypt, are Morin-Jean's forms 81, 84, and 85, which are equivalent to Dragendorff's *terra-sigillata* forms 30, 37, and 38, respectively, and were doubtless copied from them. All of these have pushed-in base rings.<sup>2</sup>

Types with true base rings or pad bases seem to be very rare outside Egypt. There is a kind of cylindrical bowl on a high base ring which, according to Morin-Jean, is particularly common at Poitiers,<sup>3</sup> and which appears from the illustrations to have a true base ring, but even that might prove on examination to have a pushed-in base. In addition to this a few stray specimens may be quoted, such as the bowl in Cologne (Fig. 2, c) of colourless cut ware with a pad base; a bowl with an apparently similar base ring from Colleville-Orival;<sup>4</sup> a bowl in Mayence (no. 4474) of green glass with upright, folded rim, convex sides, and true base ring; and a bowl of bluish green glass of the same general shape in Avignon. Of these four examples the first two are so like Egyptian ware in fabric and technique that they are surely Egyptian work, and so far as fabric is concerned the other two might well be Egyptian, though vessels of their shape have not yet been found in Egypt.

The four typical forms of late Egyptian coloured ware (Pl. III), though so common in Egypt during the fourth and fifth centuries, are extremely rare outside Egypt. One of greenish colourless glass with folded rim and true base ring from Palmyra is now in the British Museum (bought in 1893), and one of green glass with rounded, outsplayed rim and a pad base, of uncertain provenance, is also in that museum (Sloane collection, 1756). The latter is decorated with a gilded frieze of vine-tendrils on the exterior of the side accompanied by a male bust in the same technique on the interior of the base (Fig. 2, e). The Egyptian coil-rim and polished-rim types do not seem to occur in other lands. It is perhaps strange that the latter has not been found in the west, since its

<sup>1</sup> See Fremersdorf, *Röm. Gläser*, figs. 2 and 8; Niessen Cat., nos. 924-7, pl. 50 (from Cologne), and 1094-5, pl. 50 (from Syria); and three examples in the British Museum, from Askalon, bought in 1893. Bell-shaped bowls with pushed-in bases occur in the east, e.g., Kaiser Friedrich Museum, Coptic Section no. 1192 (Wulff, pl. lviii), and in the west, e.g., an example from Eschweiler, Niessen Cat., no. 855, pl. xlvi.

<sup>2</sup> The well-known mould-blown bowls with scenes of the arena and circus are also copied from Drag. 30, but they have three concentric raised coils on the base and not a real base ring. For the type see Morin-Jean, pp. 188 ff. and references *ad loc.*

<sup>3</sup> Morin-Jean, p. 127, fig. 162.

<sup>4</sup> Morin-Jean, p. 236, fig. 320.

counterparts, the plates of I B i and ii and the bowls of II A v, have turned up there sporadically.<sup>1</sup>

The bowls with rounded bases (group B) again are parallel to a corresponding group, B, in class II. So similar are the types in the two classes that the only criterion by means of which a particular example can be attributed to one class rather than to another is the relation of its depth to its diameter. After separating the specimens by this test, it is found that the examples with plain rounded or polished rims all fall into class II,<sup>2</sup> while the examples with cut and polished rim and a constriction in the side just below it are almost equally divided between two classes. Moreover, in this latter group, though the colourless wares are equally divided, all the coloured examples fall into class III. The coloured examples are presumably later than the colourless ones, so that, unlike class II B, the present group includes both early and late types.

The earliest fragment in the group is the pillar-moulded fragment, a type which is usually considered to belong to the first century. It was probably a survival even in the early house, B 25, in which it was found. The next in date are the colourless wares of division ii (a), which belong either to fabric 2 or to what may be termed late fabric 2, which seems to be a sort of transitional ware between fabrics 2 and 3.<sup>3</sup> Most of these fragments come from the B-period houses of 1926, or, in the case of the examples of late fabric 2, from the C-period houses of 1927 and 1928. Their manufacture should be placed, at latest, in the third century. Every known fragment is listed, so that examples can never have been so common as the later wares, group A.

The coloured wares of division ii (b) all come from C-period houses of 1927 and 1928, and all belong to fabric 3, 4, or 5. Their nearest parallels in technique and fabric are the lamps of class VI, and it is probable that these bowls, too, were employed as lamps.<sup>4</sup>

Examples of rounded-base bowls from Egyptian sites are few. Of the pillar-moulded variety only one other example of certain Egyptian provenance is known, a small fragment found during the

<sup>1</sup> Compare especially the shallow bowl with polished rim, exactly as type A v, but only 0.03 m. high and 0.17 m. diameter in the Victoria and Albert Museum (975. 1868), mentioned on p. 67 above.

<sup>2</sup> The solitary pillar-moulded fragment, division i, is an exception.

<sup>3</sup> It is more bubbly and of worse technique than fabric 2 proper, and yet it is more nearly colourless than the average piece of fabric 3.

<sup>4</sup> At least one of them shows traces of oily stain, such as is commonly found on the examples of class VI. For further remarks on the type and its date see p. 122 below.

excavations in the Bucheum at Armant, and now in Oxford (no. 1933. 1142). This lack of examples is somewhat surprising considering how common the type is on early sites elsewhere, not only in the west, but also in Syria, Cyprus, and the Crimea. It must surely be fortuitous and cannot be taken to imply that the type was almost unknown in Egypt. Of the type of ii (a) there is one complete specimen in the Musée Guimet. It comes from Antinoë, is almost colourless, and has as decoration three horizontal wheel cuts. A few fragments of this type exist in museums, but none is of any great merit. The Karanis finds have proved, however, how common the type was in an ordinary Egyptian town in the second and third centuries. Two fragments of a painted bowl (Fig. 2, b) of the type of no. 326 were found at Oxyrhynchus by Grenfell and Hunt in 1904-5, and are now in the Victoria and Albert Museum (nos. 690 and 690 A. 1905). The rim is polished. Below the rim, on the exterior, are two horizontal lines, one red and one yellow, forming a border to the design, which seems to represent a man and a bull between plants. On one fragment appear a man's arm and a leaf, and on the other the left leg of a man and the fore-legs of an animal.

An important bowl of greenish colourless glass, fabric 1, which was found at Hawara and is now in the Petrie collection in University College, London, deserves mention here, though it fits into no one of the above subdivisions. Its neck is much more sharply constricted than is usual on these bowls, and is, in fact, more like the necks of jars of class VIII in contour. On the rim is a horizontal cut and at the shoulder is a horizontal ridge. The body is strongly convex and the base is rounded. The body and base are covered with a honeycomb pattern of cut facets.

Even when we come to the coloured examples of division ii (b) there is a dearth of parallels in Egyptian collections. In Cairo there are two pieces (J 43344 a, b; see App., p. 312), both decorated with horizontal wheel incisions, but they, too, come from Karanis (Fig. 2, d). Apart from these and a few fragments of the type decorated with blue blobs or with mould-blown honeycomb patterns, which may be seen in Cairo and elsewhere, there is nothing.

The other provinces tell a different tale. The frequency of pillar-moulded bowls in monochrome and polychrome glass<sup>1</sup> on early

<sup>1</sup> For examples of the deep variety see, e.g., from the west, Morin-Jean, figs. 152 and 330, 1; Niessen *Cat.*, nos. 155-6, pls. viii and xlvi: and, from the east, one from Cyprus,

sites both in the east and in the west has already been commented on. Another type of ribbed bowl, later in date than the pillar-moulded, is also common all over the Empire, though it has not yet been found at Karanis in the exact form and fabric in which it occurs elsewhere.<sup>1</sup> This is form 69 in Morin-Jean's list.<sup>2</sup> It often has a marvered-in thread of a different colour from that of the rest of the bowl.

The type of division ii, bowls with plain-cut or polished rim and constriction just below, is very prevalent from the second century onward, and occurs in colourless and coloured wares, and with various decorations. On examples made outside Egypt, more particularly during the later Empire, the sides tend to be straighter, the bowls higher, and the bases flatter, and there is another type in which the mouth becomes narrower and there is a distinct neck. But these differences are really slight, and the type is essentially the same throughout the Empire from the second century to the fifth.

The earliest specimens are colourless and usually have cut decoration; many of them seem to be identical in fabric and technique with the Karanidian fragments of division ii (a), and were probably made in Egypt. As examples of almost certain Egyptian origin the following may be cited: the fine bowl from Cologne with a representation of Lynceus, Hypermnestra, and Pothos;<sup>3</sup> the bowl from Merseburg, Saxony, now in the Slade collection in the British Museum, which bears a representation of Actaeon and Artemis;<sup>4</sup> and the bowl found at Rheims with a representation of Atalanta and Hippomedon.<sup>5</sup> There are also numerous examples with geometrical

Victoria and Albert Museum, no. 1109. 1884; and another from Samaria, see Reisner, Fisher, Lyon, *Harv. Excav. at Samaria*, pp. 330-1, fig. 203.

<sup>1</sup> Type ii (a) 2, p. 121, is the nearest parallel at Karanis.

<sup>2</sup> For western examples see Morin-Jean, fig. 153; Kisa, p. 411, figs. 217-18, pl. iv, 6; Niessen Cat., nos. 19-21, pl. v; and, for eastern ones, nos. 1888. 1297 and 1302 in Oxford (from Kuklia, Cyprus), and Reinach, *Antiq. Bosp. Cimm.*, p. 124, pl. lxxvii, 6 (from Kerch).

<sup>3</sup> No. 295 in Cologne; Kisa, p. 658, figs. 246-7. The fact that the inscriptions on this and the following examples are in Greek is perhaps an additional argument for their Alexandrian origin.

<sup>4</sup> No. S. 320; *Slade Cat.*, p. 58.

<sup>5</sup> Rheims Museum, no. 2281; Morin-Jean, p. 240, fig. 324. The inscription on the bowl is clearly written ΗΠΠΟΜΕΔΩΝ. Morin-Jean takes this to be a mere cutter's mistake for 'Hippomenes'. There is, however, a pottery vase in the Metropolitan (Gréau collection) which bears relief-medallions depicting the same scene, and is inscribed in Latin letters ATALANTE, HIPPOMEDON, and SCHOENEUS; this piece was probably made in the valley of the Rhone in the third century A.D. (see Froehner,

decoration only, for example no. 475 (Fig. 2, f) in Cologne, with a decoration of circular and oval facets; nos. 474 and 586 in the same museum; no. 2039 in the Morin-Jean collection, from Rheims;<sup>1</sup> and two examples in the Niessen collection, nos. 113 and 334.<sup>2</sup> Interesting fragments of this type were found at Samaria.<sup>3</sup>

At a later date, perhaps during the third century, bowls with cut decoration begin to be made in the west. They manifest, as mentioned above, slight variations in shape from the foregoing types, and also show a stronger greenish tint in the glass and a less careful technique of cutting, but these two characteristics are present in the later Egyptian ware also. Probably the importation of cut glass from the east never ceased entirely even in the fourth century,<sup>4</sup> though the trade certainly decreased considerably after the Alexandrian workmen stopped producing good work. As examples of western fabrics of this type may be mentioned nos. 333, 335 (with geometrical design), and 337 (with a figure subject) in the Niessen collection;<sup>5</sup> no. 264 in Cologne, of bubbly glass with a strong green tint, bearing a geometrical pattern of oval facets surrounding a central hatched diamond; and no. 25. 479 in Cologne, of the narrow-mouthed type.<sup>6</sup> Of painted bowls of this type only one example can be recorded. It is in Cologne<sup>7</sup> and is of rather bubbly, colourless glass with an unworked rim. There is a poorly preserved design on the exterior depicting a female bust, the technique of which is reminiscent of the Fayûm mummy-portraits. Since the shape also is Egyptian, it seems likely that the bowl was exported from Egypt to the Rhine.

*Gaz. Archeol.*, xiv, 56; Déchelette, *Vases céram. ornés de la Gaule rom.*, ii, 279, no. 80). At the same time we have the testimony of the scholia on Apollonius Rhodius, i, 769: Ἀταλάντη. Ἰάσονος θυγάτηρ, ἣν ἔγημε Μειδανίων. Ἐπέρα γάρ ἐστιν ἡ Ἀργεία (ἢ Σχοινέως) ἣν ἔγημεν Ἰππομέδων. These scholia claim to have been excerpted from those of Lucillos of Tarrha (first century A.D.), Sophocles (? second century A.D.), and Theon (first century A.D.). There are therefore three independent witnesses for the name of Hippomedon as a variant for Hippomenes in the Atalanta myth, and they can all be dated to one of the first three centuries of the Christian era. They cannot all three be accused of ignorance or carelessness, as Froehner, Déchelette, and Morin-Jean suggest, and we must assume that there was a variant tradition upon which they all drew.

<sup>1</sup> Morin-Jean, fig. 319.

<sup>2</sup> Niessen Cat., pls. xxiii and xxvi. No. 113 has, besides its cut decoration, a chain pattern of threads trailed on horizontally.

<sup>3</sup> Reisner, Fisher, Lyon, *Harv. Excav. at Samaria*, 16 a-c, p. 331, fig. 203.

<sup>4</sup> Compare in this connexion the counterparts of Alexandrian cylindrical bottles with scratched decoration which have been found in the west, p. 256 f. below.

<sup>5</sup> Niessen Cat., pls. xxvi (333, 335) and xxvii (337). Very similar to the last example in decorative technique are two bowls in Bonn; Lehner, *Führer*, i<sup>2</sup>, pl. xvii, 4 a and c.

<sup>6</sup> Fremersdorf, *Röm. Gläser*, fig. 35.

<sup>7</sup> No. 769, from the Luxemburgerstrasse, Cologne; Kisa, p. 817.

This type of bowl, cut technique and all, was copied freely by the potters of *terra sigillata* during the second and third centuries.<sup>1</sup>

Parallels to the coloured wares of division ii (b) from other sites are equally common. Examples of greenish glass, fairly bubbly, without decoration or with a simple decoration of wheel incisions with or without coloured blobs as well, are found in great quantity in late Roman and Frankish graves of the fourth and fifth centuries in Gaul and the Rhineland.<sup>2</sup> These are exactly parallel to the pieces listed under ii (b) 1-3. Similar pieces are found as frequently in the east.<sup>3</sup> Examples with mould-blown honeycomb pattern comparable to the fragments listed under ii (b) 4 are also found in both east and west.<sup>4</sup> Sometimes these types occur with thread decoration,<sup>5</sup> and in Frankish graves a development of the shape with a narrow mouth and a pointed kick is very common.<sup>6</sup>

A few coil bases, chiefly of fabric 2, with one of fabric 8, which are placed together as group c, are early, and parallel in date and fabric to the colourless fragments of B ii (a). They belong to deep bowls, and the complete shape can be safely restored on the basis of the example from Curium (Fig. 2, a), of which the full description is given on p. 124.

The only other fragment of such a base known from Egypt is in the British Museum, Egyptian Department, no. 22519, and was found at Tanis in 1885. Outside Egypt, apart from the Curium bowl, another complete example is published by Froehner,<sup>7</sup> and as for base fragments, there are some in Reading from Silchester, and two others, both found in London, are now in the London Museum (nos. A 12499 and 27453).

The three fragmentary specimens on flat or concave bases classed

<sup>1</sup> E.g., Oswald and Pryce, *Terra Sigillata*, p. 225, pl. lxxviii, and Niessen Cat., pl. lxxii, r (fragment).

<sup>2</sup> E.g., Morin-Jean, p. 125, figs. 154 and 299; Niessen Cat., nos. 140-5, pls. iv, x, and xii; Kisa, p. 476, fig. 144; Straub, *Strasbourg*, p. 21, pl. v, 3.

<sup>3</sup> See the bowls, nos. 1910.67 and 358 in Oxford from Kerch, and others from the same site in the Louvre; and, for Syrian examples, Fortnum collection G 23 in Oxford, from Tyre, and de Ridder, no. 532, p. 243, pl. xxviii, from Umrit.

<sup>4</sup> E.g., Kisa, fig. 168 f (formerly in the Merkens collection in Cologne); Morin-Jean, p. 193, fig. 254 (also fig. 253, but with variant decoration). There is a fine complete example of this exact type now in the Musée Guimet, Lyons, which was found in the Hoggar, Sahara. Examples from Syria are in the Berlin Antiquarium, in the British Museum (from Tyre), and in the de Clercq collection (de Ridder, nos. 529-31, p. 242, pl. xxvii, from Tartus and Barja, the ancient Porphyron). An example from Syracuse is published by Führer and Schultze, *Die altchristl. Grabst. Siziliens*, p. 280, fig. 108.

<sup>5</sup> Morin-Jean, fig. 155.

<sup>6</sup> Fremersdorf, *Denkmäler*, pl. 44.

<sup>7</sup> Froehner, *Charvet Cat.*, p. 94 and vign. p. 70.

as group D belong either to fabric 2 or to fabric 8. They are probably third century in date.

Nothing parallel to these can be quoted from other sites in Egypt, but there are numerous types of deep bowl with flattened or concave bases which are found in other provinces. Of early shapes the most important is the well-known first-century type, usually of deep shades of green, yellow, blue, or violet, examples of which are widespread.<sup>1</sup> The later types approximate chiefly to Morin-Jean's forms 75 and 76, but vary in decoration. Some have thumb indents,<sup>2</sup> some have small pinched knobs in groups or singly,<sup>3</sup> and some have raised ribs.<sup>4</sup> All are so common in Syria and the west that it is strange that no parallels seem to have been found in Egypt.

The fragmentary rims in group E belong to one or other of the two colourless fabrics. They are all probably of the second or third century.

#### SKELETON CLASSIFICATION

- A. With base ring
  - I. Folded rim, outward
    - (a) Base ring with post technique—all true rings
    - (b) Base ring with pontil technique—all pad bases
      - 1. Bell-shaped body
      - 2. Convex-sided body
  - II. Folded rim, inward
    - (a) Base ring with post technique—all true rings
    - (b) Base ring with pontil technique—No EXAMPLES
    - (c) Pushed-in base ring
  - III. Rounded rim
    - (a) Base ring with post technique—all true rings
    - (b) Base ring with pontil technique—No EXAMPLES
    - (c) Pushed-in base ring
      - 1. Colourless wares
      - 2. Coloured wares
  - IV. Coil rim
    - (a) Monochrome
      - 1. Greenish colourless
      - 2. Green
      - 3. Pale yellowish green
      - 4. Yellow
      - 5. Purple

<sup>1</sup> E.g., Fremersdorf, *Röm. Gläser*, fig. 8, and examples in Oxford (1888. 1300, from Kuklia, Cyprus), and in the British Museum (from Nervi, bought in 1887; another from the Cesnola collection, Henderson bequest, 1878, &c.).

<sup>2</sup> E.g., Morin-Jean, fig. 255; *Niessen Cat.*, nos. 274–94, pls. xxii, xxiii, and xlvi.

<sup>3</sup> E.g., Kisa, fig. 152 (from Cologne); Morin-Jean, figs. 307 and 309–10 (all from sites in Gaul).

<sup>4</sup> E.g., *Niessen Cat.*, nos. 212–14, pl. xi. Compare also a similar type found in Denmark, Kisa, p. 904, fig. 375.

- (b) Bichrome
  - 1. Colourless with dark green coils
  - 2. Colourless with blue coils
  - 3. Greenish colourless with light green coils
  - 4. Greenish colourless with dark bluish green coils
  - 5. Green with light blue coils
  - 6. Green with dark blue coils
  - 7. Green with deep bluish green coils
  - 8. Green with streaky reddish brown coils
  - 9. Yellowish green with green coils
  - 10. Yellow with green coils
  - 11. Yellow with light blue coils
  - 12. Pale purple with light green coils
  - 13. Pale purple with blue coils
  - 14. Purple with light green coils
  - 15. Purple with bluish green coils
- v. Polished rim
- B. With rounded base
  - i. Pillar-moulded type, with plain, rounded rim
  - ii. Plain rim, usually polished smooth, with constriction just below
    - (a) Colourless wares
      - 1. Wheel-cut decoration
      - 2. Pinched-rib decoration
      - 3. Painted decoration
    - (b) Coloured wares
      - 1. Plain
      - 2. Horizontal wheel incisions
      - 3. Horizontal wheel incisions and blue blobs
      - 4. Mould-blown decoration
  - C. With coil base
  - D. Flat or concave base, without ring
  - E. Rims from bowls of uncertain shape

#### A. WITH BASE RING

##### I. FOLDED RIM, OUTWARD

###### (a) BASE RING WITH POST TECHNIQUE—ALL TRUE RINGS

Fragments of this type were not so common as those of the parallel type with inward-folded rim, division ii below. The three following complete examples were listed:

221. 27/SG/c Mich. 5921.

PL. XIV

Pale green; intact; one patch of milky-pitting weathering; bubbly with many black impurities; blowing spirals noticeable.

H. 0.088 m. D. 0.151 m. A.T. 0.0013 m.

Hollow rim, folded outward and downward. Straight sides tapering to bottom where they curve in to meet the base ring. Base flat. True base ring, almost vertical, with faint slanting impressions on exterior. Post technique.

Fabric 3.

**222.** 27/c 56 F/H Mich. 6200.

Greenish colourless; in fragments, almost complete; frosted, with spots of milky weathering as well; bubbly with some white stone.

H. c. 0.09 m. D. c. 0.16 m. A.T. 0.0015 m.

Shape as no 221.

Fabric 3.

**223.** 28/B 138 C/A Mich. 6228.

PL. XIV

Greenish yellow; fragment of rim, side, and bottom; spot of milky weathering; very bubbly, with many black impurities; blowing spirals noticeable.

H. 0.055 m. D. 0.11 m. A.T. 0.002 m.

Shape as no. 221. Frieze of scratched circles round side and below that a row of irregular dots.

Fabric 4 or 5.

The following examples of buff colourless or purple base rings should be mentioned; they belong either here or in division ii below.

**224.** 27/c 29 C/EI Mich. 6170.

Buff colourless; base ring only; no weathering; bubbly.

D. base ring 0.035 m.

Flat base. True base ring, outsplayed, with faint slanting impressions. Post technique.

Fabric 3 (?).

**225.** 24/5020 A/O Mich. 5805.

As no. 224, but larger and with milky weathering. D. 0.045 m.

**226.** 28/203 A\*/G.

As no. 224, but better material; perhaps fabric 2.

**227.** 25/4011/L Mich. 6059.

Deep purple; base ring only; no weathering; bubbly.

D. 0.04 m.

Convex base. True base ring, outsplayed, with well-marked slanting impressions.

Post technique.

Fabric 6.

### (b) BASE RING WITH PONTIL TECHNIQUE—ALL PAD BASES

Numerous complete examples and many fragments occurred.

#### 1. *Bell-shaped body*<sup>1</sup>

**228.** 26/BC 61 D/D<sup>1</sup> Mich. 5532.

PLS. III and XIV

Yellow; intact; usage stains, no weathering; very few bubbles and impurities.

H. 0.078 m. D. 0.118 m. A.T. 0.001 m.

Hollow rim, folded outward and downward. Sides bent outward and then again upward at top, thus forming a shelf inside the rim, probably to hold a lid; below

<sup>1</sup> The bell-shaped bowl with its angular rim was specially adapted for holding a lid. An actual example of such a bowl with a lid is preserved in Philadelphia (M.S. 5558 and 5558 A, case XIV, no. 23, bought at Luxor). It is of deep brown transparent glass, without a base ring, and is of Arabic date, but it will illustrate the earlier usage.

this they are almost vertical. Short, sloping bottom connecting sides and base.  
Base concave with pointed kick and pontil mark. Pad base with criss-cross slanting impressions on exterior.

Fabric 4.

**229.** 26/BC 61 D/D<sup>2</sup> Mich. 5533.

Dark sea green; intact; no weathering; clear, but very bubbly; a few black impurities.

H. 0.068 m. D. 0.136 m. A.T. 0.001 m.

Shape as no. 228.

Fabric 4.

**230.** 25/209 C/Q Mich. 5530.

Yellow; one crack in base; no weathering; material fair; some large bubbles and some impurities; blowing spirals.

H. 0.074 m. D. 0.125 m. A.T. 0.002 m.

Shape as no. 228.

Fabric 4.

**231.** 25/209 C/R Mich. 5531.

Yellow with some purple streaks; intact; dulled, but no weathering; material not so good as that of no. 230.

H. 0.078 m. D. 0.113 m. A.T. 0.002 m.

Shape as no. 228, but somewhat asymmetrical, particularly at rim.

Fabric 4.

**232.** 28/C 42 J/N Mich. 5914.

Yellow; radiate crack near rim; usage stains, no weathering; bubbly with impurities in rim.

H. varies 0.057-0.062 m. D. 0.119 m. A.T. 0.0013 m.

Shape as no. 228.

Fabric 4.

**233.** 28/C 42 J/M Mich. 5913.

Pale yellow; intact; usage stains, no weathering; material fair; some pin-prick bubbles and some impurities in rim; blowing spirals.

H. 0.065 m. D. 0.134 m. A.T. 0.0015 m.

Shape as no. 228, but slanting impressions not criss-cross.

Fabric 4.

**234.** 28/C 42 J/O Mich. 5915.

Greenish yellow; intact; usage stains, no weathering; material fair; pin-prick bubbles, and some impurities in rim; blowing spirals.

H. 0.072 m. D. 0.124 m. A.T. 0.001 m.

Shape in general as no. 233, but rim and base ring smaller in comparison to rest of bowl.

Fabric 4.

## 2. Convex-sided body

**235.** 28/C 42 F/K Mich. 5918.

PLS. III and XIV

Green; two radiate cracks in side; no weathering; full of pin-prick bubbles and black impurities.

H. varies 0.057-0.067 m. D. 0.09 m. A.T. 0.0007 m.

Hollow rim, leaning slightly inward, but folded outward and downward. Convex

sides curving in towards base ring and giving bowl a roughly semicircular contour. Base concave with pointed kick and pontil mark. Pad base with well-marked slanting impressions on exterior of ring. An asymmetrical bowl, particularly at rim.

Fabric 4.

**236.** 28/c 42 J/Q Mich. 5917.

Pale olive green; hole in side; strain cracks and usage stains, spots of milky weathering on rim; material fair; some pin-prick bubbles and some impurities on rim; blowing spirals noticeable.

H. 0.08 m. D. varies 0.111-0.114 m. A.T. 0.0008 m.

Shape as no. 235, but a fairly symmetrical bowl.

Fabric 4.

## II. *FOLDED RIM, INWARD*

### (a) BASE RING WITH POST TECHNIQUE—ALL TRUE RINGS

The following complete examples occurred; fragments were very numerous:

**237.** 24/4029 G<sup>1</sup>/G Mich. 5535.

PLS. III and XIV

Dull greenish colourless; a few cracks; very much scratched and stained by usage, no weathering; material fair.

H. 0.059 m. D. 0.117 m. A.T. 0.0015 m.

Hollow rim, folded inward and downward. Sides straight and tapering to bottom, where they curve inward to meet base. Base convex. True base ring, slightly outsplayed. Post technique.

Fabric 3.

**238.** 24/4029 G<sup>1</sup>/H Mich. 5536.

Greenish colourless, with one yellow streak in rim; chip out of base ring; usage scratches, no weathering; material very bad indeed; full of bubbles and impurities.

H. 0.063 m. D. 0.11 m. A.T. 0.0015 m.

Shape as no. 237, but base flat and not convex, and faint slanting impressions on base ring.

Fabric 3 or 5.

**239.** 25/5087 B/H Mich. 5537.

Brownish yellow; hole in one side; incipient iridescence over whole surface; material bubbly, with impurities; blowing spirals very noticeable; on top of rim some particles of sand, picked up when the bowl was turned upside down on the ground to cool.

H. 0.064 m. D. 0.117 m. A.T. 0.002 m.

Shape as no. 238, but rim fold flattened out on top, giving it a triangular contour.

Fabric 5.

**240.** 28/SG/NIII Mich. 5919.

Brown with purple streaks; intact; no weathering; material as no. 239.

H. 0.065 m. D. 0.11 m. A.T. 0.0025 m.

Shape as no. 237. The same flattening of rim fold on top as on no. 239.

Fabric 5.

**241.** 27/c 51 k<sup>1/c</sup> Mich. 6189.

Complete rim only.

Greenish colourless, D. 0.105 m. Like no. 237, but coated inside rim fold with some pink substance.<sup>1</sup> Fabric 3.

(b) BASE RING WITH PONTIL TECHNIQUE

No example occurred.

(c) PUSHED-IN BASE RING

Fragments only occurred; all are listed.

**242.** 28/c 57 m/b Mich. 6236.

PL. XIV

Bluish green; almost whole rim and part of sides and base ring in fragments; milky-pitting weathering; very bubbly.

H. 0.066 m. D. 0.124 m. A.T. 0.001 m.

Hollow rim folded inward and downward. Straight sides tapering to bottom, where they curve in toward base. Base concave with kick and pontil mark. Hollow, tubular base ring.

Fabric 8.

**243.** 24/5006 a/aa Mich. 5841.

Bluish green; complete rim only; no weathering; bubbly.

D. 0.073 m. A.T. 0.0015 m.

Rim as no. 242.

Fabric 8 (?).

**244.** 28/b 167 k/l.

Colourless with greenish tinge; fragments of rim only; no weathering; very bubbly.

D. c. 0.12 m.

Rim as no. 242.

Fabric 2 or 3.

The following base ring of pushed-in technique should be mentioned here. It probably belongs to a deep bowl.

**245.** 27/b 101 c/ci Mich. 6158.

PL. XIV

Purple; fragment of base ring only; patches of iridescence; very bubbly.

D. 0.05 m. A.T. 0.0015 m.

Fragment showing the technique of manufacture very clearly. The fold has been pinched in from each side to form a solid ring except at the bottom, where it remains tubular. The junction of the two parts of the fold on the inside of the base is quite obliterated.

Fabric 6.

<sup>1</sup> This technique is curious, but a similar pink coating is found on Cairo J 47105 h in Wainwright's hoard from Karanis (Wainwright, p. 82), and a top of an inkwell (?) in Cologne (no. 23.400) has a hollow, folded rim filled with liquid. See also Morin-Jean, p. 143, for a late type of carinated beaker (forms 110-11) with pushed-in base ring, 'dont le gros bourrelet creux est souvent rempli d'un émail blanchâtre, rosé ou brun.'

III. *ROUNDED RIM*(a) *BASE RING WITH POST TECHNIQUE—ALL TRUE RINGS*

All are coloured wares.

The following complete examples and fragments were listed; numerous other fragments occurred:

**246.** 24/4023 B/A Mich. 5538. Donor.

Brownish yellow; intact; no weathering; material fair; few bubbles but many black impurities; blowing spirals noticeable.

H. 0.058 m. D. 0.119 m. A.T. 0.002 m.

Solid rim, bent out sharply from sides at the top and ending in a swelling above and below. The edge has probably been formed by folding over downward.<sup>1</sup> Sides straight, tapering from rim to base. Base flat. True base ring, slightly outsplayed, with no trace of slanting impressions. Post technique.

Fabric 5.

**247.** 27/C 56 E/CI Mich. 5912.

PLS. III and XIV

Green; intact; slight dullness on outside, no weathering; very bubbly, with black impurities.

H. varies 0.055–0.058 m. D. 0.127 m. A.T. 0.002 m.

Shape as no. 246, but base slightly concave and faint traces of slanting impressions on base ring.

Fabric 5.

**248.** 24/5024 B/P Mich. 5539.

Dark brown with purple streaks; in many fragments and not quite complete; milky-pitting weathering in spots on rim; material good; not very bubbly and few impurities.

D. c. 0.20 m. A.T. 0.003 m.

Shape as no. 246, but traces of folding on rim not so evident. The base ring is large in proportion to the whole bowl.

Fabric 5.

**249.** 25/5087 B/G Not retained.

Yellow; in fragments, probably complete; no weathering; material good; few bubbles and impurities.

D. 0.13 m. A.T. 0.002 m.

Shape as no. 246.

Fabric 5.

**250.** 24/4029 G<sup>1</sup>/I.

Greenish colourless; in fragments, complete; strain-cracked, no weathering; material fair; few bubbles, but many black impurities on rim.

D. c. 0.13 m. A.T. 0.002 m.

Shape as no. 246. Base ring polished smooth, leaving no trace of post technique.

Fabric 3.

**251.** 27/C 42 D/D Mich. 6176.

Dark blue; fragments of rim and side; iridescent in parts; very bubbly, and many impurities.

<sup>1</sup> There is an indent all round the rim underneath which seems to indicate folding.

Dimensions roughly as no. 250.

Shape as no. 246.

Fabric 7.

**252.** 24/137 D/AC Mich. 5369.

Fragments of a bowl similar to no. 251. Fabric 7.

**253.** 27/C 56 E/W Mich. 6199.

Deep purple; fragment of rim only; spotty, milky weathering beginning.

D. c. 0.11 m.

Shape as no. 246.

Fabric 6.

**254.** 26/B 27 C/J Mich. 6125.

Colourless with greenish tinge; almost complete rim; frosted; bubbly.

D. c. 0.125 m. A.T. 0.0015 m.

Shape as no. 246, but rim section uneven and asymmetrical, with a different contour on each side.

Late fabric 2, or fabric 3.

**255.** 25/226 A/A Mich. 5534.

PL. XIV

Dark olive green; base ring broken off, otherwise intact; usage scratches, no weathering; full of pin-prick bubbles and small black impurities.

H. without base ring 0.048 m. D. 0.104 m. A.T. 0.0025 m.

Rounded rim bent out horizontally from top of sides and then upward at edge.<sup>1</sup>

Shallower bowl than before with slightly curved sides producing with rim an S-shaped contour. Base convex without kick or pontil mark. The bowl had a true base ring, outspread. A symmetrical piece.

Fabric 5.

The following fragments with ribs or pinches occurred:

**256.** 24/5021 A/J Mich. 5764.

PL. XIV

Dark green; three fragments of rim and side, perhaps not all from same bowl; no weathering; bubbly.

D. 0.136 m. A.T. 0.001 m.

Rounded rim, bent out from side at angle of 45°, instead of horizontally; otherwise as no. 246. On outside of bowl a faint series of spiral, raised ribs.

Fabric 5.

**257.** 24/122 E/N Mich. 5364.

PL. XIV

Yellow; fragment of rim only; no weathering; bubbly.

Dimensions roughly as no. 256. A.T. 0.001 m.

Rounded rim as no. 256, with edge scalloped horizontally<sup>2</sup> by pinching.

Fabric 5.

<sup>1</sup> The rim is rounded off without any preliminary folding. In Brooklyn (Wilbour collection) there is a bowl of this type, of dark brown glass, from Egypt.

<sup>2</sup> A complete bowl of this type (Fig. 2, g), from Mt. Carmel in Syria, is now in Toledo (no. 354. 9871). It is of green glass and has thirteen scallops at the edge of the rim, and a true base ring with slanting impressions. H. 0.083 m. D. 0.158 m. No. 354. 987 in the same museum, also from Syria, is similar, but has fifteen scallops. H. 0.063 m. D. 0.127 m. Though both were found in Syria, their general shape, and particularly their base technique, suggest an Egyptian origin.

258. 24/4020 A/G Mich. 5727.

Green; fragment of rim; pitted, with iridescence in the pits; bubbly.

Dimensions roughly as no. 256. A.T. 0.002 m.

Shape as no. 256.

Fabric 5.

259. 26/B 73/F Mich. 6143.

PL. XIV

Deep brown; fragment of rim; no weathering; bubbly.

Dimensions roughly as no. 256. A.T. 0.0015 m.

Rounded rim as no. 256, but with pinched scalloping on under side.<sup>1</sup>

Fabric 5.

(b) BASE RING WITH PONTIL TECHNIQUE

No example occurred.

(c) PUSHED-IN BASE RING

i. *Colourless wares*

There are no complete examples, but the following fragments occurred:

260. 26/B 4 O/K Mich. 6094.

PLS. III and XIV

Colourless with greenish tinge; base and about one-third of sides and rim only; frosted; material good.

H. 0.047 m. D. 0.07 m. A.T. 0.0015 m.

Thick, rounded rim, probably formed by folding. Sides very slightly convex, tapering downward from rim to base ring. Base concave with no trace of reamer mark.<sup>2</sup> Base ring with post technique, circular in section and solid, but originally formed by pushed-in technique.

Fabric 2.

A fragment of a base, similar but smaller, was found in the same room.

261. 26/B 4 F/E Mich. 6092.

26/B 9 P/Q Mich. 6104.

27/C 55 D/Y Mich. 6196.

24/5060 A/G Mich. 5823.

Four fragments of rims from bowls like no. 260, D. c. 0.08 m., 0.12 m., 0.07 m., 0.07 m., respectively. The rim sections vary slightly but the type of all four is essentially the same. Fabric 2.

262. 26/B 49/G Mich. 6138.

Greenish; base ring and one fragment of rim; no weathering; very bubbly indeed. D. base ring 0.04 m. A.T. 0.0005 m.

Thick, rounded rim, with a trailed-on thread of similar glass about 0.01 m. from edge. Sides as no. 260. Base concave, with pontil technique. Base ring asymmetrical and unevenly formed; pushed-in technique.

Fabric 8.

<sup>1</sup> A similar bowl in the Louvre (MND 1123, from near Kerch) of yellowish brown glass also has the scalloping on the under side of the rim. H. 0.08 m. D. 0.163 m. There is no reason to doubt an Egyptian origin in this case either.

<sup>2</sup> The use of such an instrument might have been expected for pushing in the base.

263. 26/B 7 L/F Mich. 6098.

Colourless with greenish tinge; base ring and part of side; frosted; material good, but some pin-prick bubbles.

D. base ring 0.042 m. A.T. 0.001 m.

Shape as no. 262, but no trace of either post technique or pontil.<sup>1</sup>

Fabric 2.

264. 26/B 2 H/YI Mich. 6078.

PL. XIV

Colourless with greenish tinge; base ring complete; no weathering; material good; few pin-prick bubbles.

D. base ring 0.041 m. A.T. 0.0015 m.

Shape as no. 262. This shows the technique very well, the ring having been left hollow and not folded solid as in previous examples. In the kick is a flat-edged reamer mark showing distinct traces of metal. Post technique.

Fabric 2.

265. 24/5011 B/E Mich. 5770.

24/5016 H/E Mich. 5812.

Two bases of bowls, as no. 262, with hollow tubular base rings. Colourless with slight greenish tinge in fracture, frosted. D. base ring c. 0.04 m. A.T. 0.0005 m.

Fabric 2.

266. 24/5028 C/C Mich. 5802.

PL. XIV

Colourless with greenish tinge in fracture; base and part of sides; no weathering; material fair.

D. base ring 0.047 m. A.T. 0.001 m.

Shape and technique as no. 262, but horizontal coil of similar glass on body not far above base ring.

Fabric 2.

267. 24/169 AE<sup>2</sup>/D Mich. 5854.

PL. XIV

Greenish colourless; base and part of sides; no weathering; very bubbly.

D. base ring 0.045 m. A.T. 0.001 m.

Shape as no. 262. A technologically interesting example, in which the base ring has been badly formed so that the pushed-in technique is still perfectly apparent.

Base concave with pontil technique.

Fabric 8.

## 2. Coloured wares

Here belong, probably, the two following rims of coloured bowls:

268. 25/5084 A/D Mich. 6071.

PL. XIV

Greenish colourless; fragment of rim and side; frosted; bubbly.

D. 0.092 m. A.T. 0.001 m.

Rim rounded. Sides as no. 260. There is no trace of the base, but it almost certainly was of the tubular type.

Fabric 3 or 8.

269. 27/C 57 H/C Mich. 6205.

Purple to purplish colourless; fragment of rim and side; no weathering; bubbly.

D. c. 0.07 m. A.T. 0.0004 m.

Shape as no. 268.

Fabric 6.

<sup>1</sup> The marks of whichever was used have probably been removed by polishing.

## IV. COIL RIM

For general remarks on coil rims see p. 56 above. Of coil rim bowls of class III only rim fragments, or fragments of rim and side have so far been found, with the possible exception of no. 274. Almost all the known fragments are listed.

## (a) MONOCHROME

1. *Greenish colourless*

270. 28/157\*/K.

Thick coil at rim, no weathering; bubbly. Fabric 3.

2. *Green*

271. 28/cs 90/F.

Thin coil 0.005 m. from rim, no weathering; very bubbly. Fabric 8.

272. 27/c 57 J/F Mich. 6207.

PL. XIV

Green; fragment of rim and side; milky weathering, well advanced in places; bubbly. H. of side 0.035 m. D. 0.09 m. A.T. 0.002 m. Thick, rounded rim with thin coil just below. Fabric 5 (?).

3. *Pale yellowish green*

273. 27/230 E/F Mich. 6153.

One coil, well fused in, on top of rim; two more just below rim; two more, not so well fused in, lower down; no weathering; bubbly. Fabric 4 (?).

4. *Yellow*

274. 28/c 121 G/C Mich. 6241.

PL. XIV

Rim fragment and a base ring which seem to belong to the same bowl; spots of milky weathering; very bubbly and many blobs of unfused sand. H. 0.058 m. D. 0.078 m. A.T. 0.0005 m. Rounded rim with one coil c. 0.01 m. below. Convex base. True base ring with faint slanting impressions. Post technique. Fabric 4.

275. 28/c 49 J/O.

Three parallel coils close together, just below rim; no weathering; bubbly. Fabric 4.

5. *Purple*

276. 26/B 47 E/H Mich. 6136.

PL. XIV

Deep purple; fragment of rim and side; no weathering; material very good; no bubbles. D. c. 0.09 m. A.T. 0.001 m. Thick, rounded rim with a thick, horizontal coil 0.01 m. below. Good workmanship and very symmetrical. Not to be attributed to fabric 6. An early piece (?).

## (b) BICHROME

1. *Colourless with dark green coils*

277. 28/C 91 K/H.

Colourless with greyish tinge; thickish coil at rim and a thinner one lower down; no weathering; material fair. Fabric 1 (?).

2. *Colourless with blue coils*

278. 25/4011/L Mich. 6059.

Rim outspayed horizontally with three parallel coils on under side; side vertical; frosted; bubbly. Fabric 2 (?).

3. *Greenish colourless with light green coils*

279. 24/4029 A/K Mich. 5842.

Rim bent slightly inward, one thick coil at rim; no weathering; very bubbly. Fabric 8.

4. *Greenish colourless with dark bluish green coils*

280. 24/5043 B/E Mich. 5826.

Rim bent inward, four coils at varying intervals down side; no weathering; bubbly. Fabric 3.

5. *Green with light blue coils*

281. 25/250/E Mich. 6039.

PL. XIV

Rim bent inward, thick coil at rim, made to resemble a triple coil by means of two horizontal grooves; milky dullness all over; bubbly. Fabric 8 (?).

6. *Green with dark blue coils*

282. 26/B 25 D/K Mich. 6120.

Rounded rim with four parallel coils just below; no weathering; bubbly. Fabric 8 (?).

283. 25/4009 A<sup>1</sup>/K Mich. 6058.

PL. XIV

Rim bent inward, thick coil at rim; no weathering; bubbly. Fabric 8 (?).

7. *Green with deep bluish green coils*

284. 27/C 29 D/L Mich. 6171.

Rounded rim, bent inward, one thin coil c. 0.015 m. below; no weathering; bubbly. Fabric 4 (?).

285. 27/C 61 A/EII Mich. 6210.

PL. XIV

Thick, rounded rim, folded over outward (?), one thick coil c. 0.01 m. below; incipient milky weathering on coil; pin-prick bubbles. Fabric 4 (?).

8. *Green with streaky reddish brown coils*

286. 28/B 138 A/E.

Rounded rim, folded over outward (?), three parallel coils just below; no weathering; bubbly. Fabric 5 (?).

9. *Yellowish green with green coils*

287. 27/CA 72/s Mich. 6219.

Thick, rounded rim, bent inward, one thick coil *c.* 0.015 m. below; no weathering; bubbly. Fabric 4 (?).10. *Yellow with green coils*

288. 26/B 26 D/D Mich. 6122.

PL. XIV

Rim bent inward, one coil at edge, and six similar ones down side at intervals; no weathering; bubbly. Fabric 4 (?).

289. 27/CS 60/L Mich. 6221.

PL. XIV

Thick, rounded rim, roughly triangular in section, one thin coil *c.* 0.01 m. below; frosted; bubbly. Fabric 5 (?).

290. 28/C 121 G/C Mich. 6241.

PL. XIV

Thick, rounded rim, roughly triangular in section, one thick coil *c.* 0.01 m. below; milky-pitting weathering; few bubbles. Fabric 5.

291. 28/C 49 J/0.

Fragment of rim like no. 290.

11. *Yellow with light blue coils*

292. 28/C 88 C/L Mich. 6238.

Thick, rounded rim, roughly triangular in section, two parallel coils just below; traces of iridescence; bubbly. Fabric 4.

12. *Pale purple with light green coils*

293. 27/C 43 G/C Mich. 6179.

PL. XIV

Rim bent slightly inward, thick coil at rim; spots of milky-pitting weathering; few bubbles. Fabric 6.

294. 26/BS 1/J Mich. 6149.

Rim fragment as no. 293 but frosted.

295. 27/C 57 H/C Mich. 6205.

PL. XIV

Rim bent slightly inward, four irregular, thin coils at rim; no weathering; bubbly. Fabric 6.

296. 28/C 88 C/L Mich. 6238.

Thick, rounded rim, coil *c.* 0.01 m. below; no weathering; bubbly. Fabric 6.13. *Pale purple with blue coils*

297. 27/C 57 H/C Mich. 6205.

PL. XIV

Streaky bowl; thick, rounded rim, bent inward, one coil *c.* 0.01 m. below; frosted; bubbly. Fabric 6.

298. 26/B 56 A/H Mich. 6140.

Rim bent inward, coil at edge and four more at intervals below; frosted; bubbly. Fabric 6.

299. 28/157\*/K.

Rim fragment like no. 298.

300. 24/5016 A/U Mich. 5777.

PL. XIV

Streaky bowl; thick, rounded rim, roughly triangular in section, two parallel coils  
c. 0.0015 m. below; frosted; bubbly. Fabric 6.14. *Purple with light green coils*

301. 26/B 25 D/K Mich. 6120.

PL. XIV

Rim bent slightly inward, one thick coil at edge, one thick and two thin coils lower  
down; incipient milky weathering; bubbly. Fabric 6.15. *Purple with bluish green coils*

302. 26/B 12 L/G Mich. 6111.

PL. XIV

Rim bent inward, one thick coil at edge, two thinner ones, parallel, c. 0.02 m. lower  
down; dulled surface, milky weathering; bubbly. Fabric 6.

303. 27/254 C/YI Mich. 6157.

PL. XIV

Rim bent slightly inward, one coil at edge, another c. 0.015 m. below; milky  
weathering on fractures; bubbly. Fabric 6.

## V. POLISHED RIM

All are colourless wares. Only the following specimens occurred:

304. 24/124 D/G with 24/118/G Mich. 5853 and 5851.

PLS. III and XIV

Colourless with greenish tinge in fracture; in fragments<sup>1</sup> but almost complete;  
dulled; frosted on fractures; material good.

H. 0.036 m. D. 0.108 m. A.T. 0.0025 m.

Rim polished in semicircular section. Sides slightly concave and tapering downward  
to join the bottom in a rounded obtuse angle. Base flat. True base ring, outsplayed.  
No trace of post or pontil technique: probably the bowl was pressed into a mould,  
not blown. Inside the bowl, near the rim, a wheel-cut horizontal circle. Another  
small wheel-cut circle in centre of under side of base. Polishing marks all over the  
surface.

Fabric 1.

305. 24/5006 A/AB Mich. 5852.

A fragment of a bowl as no. 304. Fabric 1.

The three following fragments of rims and sides probably belong  
here, but a complete restoration of the types is not yet possible.

306. 28/130\*/M Mich. 6223.

PL. XIV

Colourless with greenish tinge; fragment of rim and side; no weathering; material  
good; no bubbles.

D. c. 0.10 m. A.T. 0.002 m.

Rim polished in rectangular section. Convex sides. At rim, on exterior, a series of  
horizontal wheel incisions; 0.015 m. lower down, another.

Fabric 1.

<sup>1</sup> One large fragment was found in room D of house 124, the rest were found  
in street 118 adjoining.

307. 28/c 88 c/L Mich. 6238.<sup>1</sup>

PL. XIV

Colourless with greenish tinge; fragment of rim and side; no weathering; material fair; some bubbles and black specks.

D. c. 0.15 m. A.T. 0.002 m.

Rim polished in slightly rounded section. Convex sides. On interior, c. 0.005 m. below rim, a series of horizontal wheel incisions. Polishing marks all over surface. Fabric 1.

308. 28/c 108 B/K Cairo J 54774.

PL. XIV

Colourless with greenish tinge; fragment of rim and side; no weathering; material fair.

H. of side 0.035 m. A.T. 0.002 m.

Rim polished in slightly rounded section. Straight vertical sides joining bottom in right-angled curve. On exterior, at rim, a series of horizontal wheel incisions, and, 0.005 m. lower down, another.

Fabric 1.

The following base ring of colourless ware belongs here. The complete type may be restored by comparison with a bowl in Cologne (Fig. 2, c), of colourless ware with cut decoration.<sup>2</sup>

309. 24/5060 A/G Mich. 5823.

PL. XIV

Colourless with greenish tinge; fragment of base ring; no weathering; bubbly, with streaks due to stone.

D. base ring 0.062 m. A.T. 0.002 m.

Pad base, S-shaped contour, with unworked edge. Base of bowl concave.

Late fabric 2.

## B. WITH ROUNDED BASE

### I. PILLAR-MOULDED TYPE, WITH PLAIN, ROUNDED RIM

Only the following small fragment has so far been found at Karanis, but the type is a well-known one of the first and early second century and examples have been found all over the Roman Empire (pp. 99-101 above).

310. 26/B 25 L/R Mich. 6121.

PL. XIV

Clear green; fragment of rim and side; usage scratches, no weathering; material good and clear, but some pin-prick bubbles.

<sup>1</sup> This perhaps belongs to class II.

<sup>2</sup> No. 208 in Cologne. In fabric and technique it seems to be identical with the Karanis goblets nos. 408-9, p. 149 below:

Colourless with greenish tinge; intact; no weathering; material good.

H. 0.06 m. D. 0.10 m.

Rim cut and polished, with constriction in sides just below. Sides strongly convex, giving bowl a squat ovoid shape. Pad base, squat S-shaped contour, with edge cut and polished. Decoration of horizontal wheel cuts and oval facets. At rim, two horizontal wheel cuts; below constriction, two more; just above base ring, two more. Between the second and third pairs are three bands of vertical oval facets in quincunx formation.

Fabric 2.

D. 0.146 m. H. of fragment 0.04 m. A.T. 0.005 m.

Plain rim, rounded and polished. Convex sides, with large raised ribs on exterior, nearly vertical and ending c. 0.015 m. from rim. The bowl has been blown or pressed into a ribbed mould and the interior afterwards polished.<sup>1</sup>

An early fabric, and not to be equated with fabric 4 or 5.

II. *PLAIN RIM, USUALLY POLISHED SMOOTH,  
WITH CONSTRICKTION JUST BELOW*

(a) COLOURLESS WARES

Only fragmentary examples occurred; all known fragments are listed.

1. *Wheel-cut decoration*

The decoration is on the exterior, and may consist of animal or floral patterns, or of wheel-cut lines and facets, or of groups of wheel incisions.

311. 26/B 2 AK/O Cairo J 52767.

PL. XIV

Colourless with greenish tinge; fragment of rim and side; one spot of milky weathering; material excellent.

D. c. 0.15 m. H. of fragment 0.045 m. A.T. 0.002 m.

Rim cut and polished. Hemispherical bowl with constriction in side just below rim, from which the sides bulge to greatest diameter about half-way down bowl. Bottom rounded. Two horizontal wheel-cut lines at rim; another just below constriction. Below that a fragmentary figure of a duck in finely cut facets with plumage indicated by scratched lines.<sup>2</sup>

Fabric 2.

312. 26/B 17 F/N Cairo J 52768.

PL. XIV

Colourless with greenish tinge; fragment of rim and side; patches of milky weathering; material excellent.

Dimensions roughly as no. 311. A.T. 0.003 m.

Shape as no. 311. One wheel-cut horizontal line at rim, another just below constriction. Below that a fragment of an animal or floral design in finely cut facets and scratched lines. Not enough extant to identify the pattern.

Fabric 2.

313. 28/C 88 C/L Mich. 6238.

Greenish colourless; fragment of side; no weathering; very bubbly.

Dimensions roughly as no. 311. A.T. 0.002 m.

Shape as no. 311. Below neck constriction a series of wheel incisions; at greatest

<sup>1</sup> That this bowl was made in a mould appears certain from the regularity of the two extant ribs; and other equally regular examples occur on other sites. More often, however, the ribs on both shallow and deep varieties of the type are so irregularly spaced and fashioned that they must have been made free-hand. Yet Kisa, p. 785, asserts that these bowls were all made in a mould.

<sup>2</sup> Figures of ducks in cut technique occur on a bowl in the Niessen collection (*Niessen Cat.*, no. 342, pl. xxviii) and on the Girton bowl (Fig. 1, c), p. 66 above.

diameter a horizontal band of vertical oval facets. Below these, two roughly cut concentric circles. On bottom, traces of more oval facets.

Fabric 2 or 3.

314. 28/C 59 K/F.

A fragment of a bowl as no. 313. Fabric 2 or 3.

315. 26/BS 1/J Cairo J 52764.

Colourless with greenish tinge; fragment of rim and side; dulled surface, milky weathering; material good and free from bubbles.

D. c. 0.15 m. A.T. 0.002 m.

Shape as no. 311. One horizontal wheel cut just below rim; two more just above greatest diameter; two more below greatest diameter near bottom. Between these two pairs of wheel cuts are two rows of vertical oval facets.

Fabric 2.

316. 26/B 7 L/F Mich. 6098.

PL. XIV

Colourless with greenish tinge; fragment of base and part of side; frosted; material clear but some pin-prick bubbles.

Dimensions roughly as no. 315. A.T. 0.0025 m.

On base a circular band of large oval facets within a wheel-cut circle. On side more oval facets, set vertically and in groups.

Fabric 2.

317. 27/C 54 E/OI Mich. 6193.

PL. XIV

Colourless with greenish tinge; fragment of rim, side, and part of base, about one-third of bowl; no weathering; material clear, but very bubbly.

H. c. 0.065 m. D. 0.098 m. A.T. 0.002 m.

Shape as no. 311. One group of faint wheel incisions at rim and another at constriction in side. Below, two horizontal bands of vertical oval facets, badly cut; below these, one band of horizontal oval facets, badly cut; on bottom, a circular band of large oval facets, well cut.<sup>1</sup>

Fabric 2 or 3.

318. 26/B 17 F/N Mich. 6112.

Colourless with green tinge; fragment of side; no weathering; bubbly.

Dimensions roughly as no. 317. A.T. 0.002 m.

Shape as no. 311. Band of sloping oval facets flanked by groups of wheel incisions.

Fabric 2 or 3.

319. 28/C 59 K/F.

28/C 88 C/L Mich. 6238.

Fragments of sides of two greenish colourless bowls, type as no. 311, with rows of oval facets and horizontal wheel cuts. Late fabric 2 or fabric 3.

320. 26/B 2 AA/G Mich. 6082.

Colourless, with greenish tinge; fragment of rim and part of side; no weathering; material excellent.

D. c. 0.13 m. A.T. 0.002 m.

Shape as no. 311. Two groups of horizontal wheel incisions at rim. Between constriction and greatest diameter a pair of horizontal wheel cuts and just below greatest diameter a similar pair.

Fabric 2.

<sup>1</sup> The maker seems to be losing, not the skill, but the desire to produce good cutting.

321. 26/cs 1/H Mich. 6151.

Colourless with greenish tinge; fragment of rim and side; frosted; material fair, but many pin-prick bubbles.

D. c. 0.10 m. A.T. 0.002 m.

Shape as no. 311. At rim a pair of horizontal wheel cuts. Below constriction, one very broad wheel cut.

Fabric 2.

322. 25/286 D/F Mich. 6052.

PL. XIV

Colourless with greenish tinge; three fragments of rim and side; spots of milky weathering; material poor; many pin-prick bubbles and one very large bubble; opaque white streaks of stone.

H. c. 0.07 m. D. 0.10 m. A.T. 0.002 m.

Shape as no. 311. Two groups of horizontal wheel incisions at rim. A well-made horizontal wheel cut just below side constriction. Another wheel cut, less well made, just below greatest diameter. Below that a group of horizontal wheel incisions.

Very late fabric 2.

323. 26/B 21 P/B Mich. 6116.

Colourless with greenish tinge; fragment of rim and side; no weathering; bubbly.

D. c. 0.12 m. A.T. 0.0008 m.

Shape as no. 311. One group of horizontal wheel incisions at rim and another just below constriction in side.

Late fabric 2.

## 2. *Pinched-rib decoration*

324. 26/B 4 E/G Mich. 6091.

PL. XIV<sup>1</sup>

Colourless with greenish tinge; fragment of rim and side; frosted; material good; some pin-prick bubbles.

D. c. 0.09 m. A.T. 0.001 m.

Rim cut and polished in convex section. Constriction in side just below rim, from which the side bulges out to greatest diameter half-way down. Bottom missing. One horizontal wheel cut at rim and another just below the constriction. Below that are two roughly pinched-out vertical ribs, and this decoration was apparently continued round the vase. There is a slight rise in the surface of the interior of the bowl corresponding to each of the ribs outside.<sup>2</sup>

Fabric 2.

325. 25/5048/LI Cairo J 52776 B.

PL. XIV

Colourless with greenish tinge; fragment of bottom and side; dulled surface; bubbly, with some traces of stone.

Dimensions roughly as no. 324. A.T. 0.002 m.

Shape of bowl probably as no. 311. On the side and on the bottom are parts of a decoration of branches (?) in relief, in the form of pinched-out ridges of a vague fish-bone pattern. They do not, apparently, form any particular design.

Late fabric 2.

<sup>1</sup> This is the nearest parallel at Karanis to the common type of ribbed bowl with marvered-in threads; see p. 101 above.

<sup>2</sup> This is to be expected from the technique of the manufacture of the ribs, which were made by pressing out the glass with the point of the reamer.

3. *Painted decoration*<sup>1</sup>

326. 28/c 88 c/a.

PL. XIV

Colourless with greyish tinge; three fragments of rim and side, not contiguous; no weathering; material poor, with many pin-prick bubbles and some stone.

From a largish bowl. A.T. 0.001 m.

Rim cut and roughly polished. Slight constriction just below rim from which side bulges gradually to greatest diameter. Bottom rounded. Painted decoration of floral pattern outside, but the fragments are too small to enable the design to be deciphered. Yellow and brown stalks with light blue, yellow, and reddish brown petals and green leaves.

Late fabric 2 (?).

327. 25/5085 B/F Mich. 6072.

PL. XIV

Colourless with greyish tinge; one small fragment of side; frosted in parts; material fair.

A.T. 0.0015 m.

Shape of vessel uncertain but probably from a bowl similar to no. 326. Painted pattern outside in red and yellow lines (floral design?).

Fabric 2.

## (b) COLOURED WARES

One almost complete example and some smaller fragments occurred; all known fragments are listed.

1. *Plain*

328. 28/c 47 E/c1 Mich. 6235.

Dark green; fragment of rim and side; no weathering; very bubbly.

D. c. 0.07 m. A.T. 0.002 m.

Rim cut and not polished; constriction in side just below, from which the side bulges out to greatest diameter. Bottom rounded. No decoration.

Fabric 5 or 8.

2. *Horizontal wheel incisions*

329. 27/c 45 A/c Mich. 5967.

PLS. III and XV

Clear green; broken in many fragments and repaired, some pieces missing; surface oily and stained,<sup>2</sup> one patch of milky weathering; bubbly; few impurities.

H. 0.05 m. D. 0.12 m. A.T. 0.001 m.

Rim cut and smoothed. Constriction in sides just below rim, from which they curve gradually inward to base. Bottom rounded. Two groups of wheel incisions just below the constriction.

Fabric 5.

330. 28/c 111 L/A1 Mich. 6240.

PL. XV

Colourless with greenish tinge; fragments of rim and side; usage stains, no weathering; many pin-prick bubbles.

<sup>1</sup> Painted decoration on Roman glass is not common; see Morin-Jean, pp. 248-9, and Kisa, pp. 810 ff., figs. 338-53. For fragments from Egypt see pp. 68, 100, and 138, and for a complete bowl in Cologne see p. 102.

<sup>2</sup> This piece was found with two lamps, nos. 455-6, and is of identical fabric and decoration with theirs. Very probably it, too, was used as a lamp; see Crowfoot and Harden, p. 197.

H. 0.071 m. D. 0.108 m. A.T. 0.002 m.

Shape as no. 329. One group of wheel incisions at rim; eight more groups in pairs at intervals down side.

Fabric 2 or 3.

### 3. Horizontal wheel incisions and blue blobs

331. 25/261/1 Mich. 6043.

PL. XV

Yellowish green; four fragments of rim, side, and bottom, giving a complete restoration of the type; usage stains, no weathering; material of bowl fair, blue blobs very bubbly.

H. 0.053 m. D. 0.09 m. A.T. 0.002 m.

Shape as no. 329, but rim unworked. A broad series of wheel incisions just below constriction and another below greatest diameter. Between these, at greatest diameter, a horizontal frieze of blue blobs in which the sequence of one large blob followed by a triangular group of six small ones is repeated several times round the bowl.

Fabric 5.

332. 27/B 109 A/P Mich. 6161.

A fragment of a bowl as no. 331. Fabric 5.

### 4. Mould-blown decoration

333. 27/C 43 E/Y Mich. 6178.

Yellowish green; two fragments of rim and part of side; no weathering; bubbly.

D. c. 0.09 m. A.T. 0.002 m.

Rim cut and smoothed. Shape as no. 329, with a very slight bulge in sides at greatest diameter. Bottom lost. Mould-blown, the pattern consisting of a series of vertical ridges and hollows near rim and below that a honeycomb pattern of sunken circles which probably extended over the bottom as well as the sides.

Fabric 5.

334. 24/5001 C/G Mich. 5817.

27/C 50 A/P Mich. 6184.

Fragments of two bowls like no. 333. Fabric 5.

335. 27/C 67 A/R Mich. 6215.

PL. XV

Deep purple; fragment of rim and part of side; no weathering; bubbly.

D. c. 0.12 m. A.T. 0.001 m.

Rim cut and not rounded, with constriction just below. Not enough remains to show the shape of the lower part of the vase, but it should probably be grouped here rather than with the conical lamps, class VI below. Decoration as for no. 333, but the honeycomb pattern is formed of sunken hexagons, not circles.

Fabric 6.

336. 28/BS 160/N1 Mich. 6231.

PL. XV

Greenish colourless; fragment of rim and part of side; no weathering; few bubbles.

D. c. 0.10 m. A.T. 0.002 m.

Shape as no. 329. Sloping S-shaped corrugations on body, starting just below neck constriction.

Fabric 3.

## C. WITH COIL BASE

Unfortunately no complete specimen of the type occurred: the type may, however, be restored with the aid of a complete bowl found at Curium in Cyprus and now in Cambridge (Fig. 2, a).<sup>1</sup>

337. 26/cs 1/H Mich. 6151.

PL. XV

Colourless with greenish tinge; almost complete base; frosted; material clear, with some largish bubbles.

D. of outer coil 0.085 m. A.T. 0.0035 m.

Base flat above, convex below, with pontil mark in centre. Underneath the base are two concentric coils of similar glass. Both have now a semicircular section, the inner one being much thicker than the outer. The sides of the bowl curve upward immediately outside the outer coil.

Fabric 2.

338. 27/c 45 N/O Mich. 6183.

Greenish colourless; fragment of base; no weathering; full of pin-prick bubbles; some spots of stone.

D. of outer coil 0.07 m. A.T. 0.002 m.

Shape as no. 337, but base convex on top and flat below.

Fabric 8.

339. 24/5016 B/L Mich. 5778.

As no. 338, but more colourless glass, and probably fabric 2.

340. 24/141 A/I Mich. 5703.

As no. 339, but base convex above and below, and one base coil only. D. of coil 0.062 m. Fabric 2.

341. 28/156\*/QI Mich. 6224.

Base fragment, as no. 340.

342. 26/BC 39 A/E Mich. 6147.

PL. XV

Colourless with greenish tinge; part of base and side; frosted; material good; no bubbles.

Dimensions roughly as no. 337. A.T. 0.0025 m.

Shape as no. 337. Remains of one coil only, but there may have been another nearer the centre of the base. Side of bowl curves gently upward outside the coil.

Wheel-cut facets on exterior of bowl, both on side and on base. Design doubtful.

Fabric 2.

<sup>1</sup> Description:

Colourless with greenish tinge; intact; milky iridescence, flaking off; material fair.

H. 0.10 m. D. 0.055 m. A.T. 0.002 m.

Rounded rim, sides vertical and slightly concave, rounded junction of sides and base.

Base flat and thicker in centre than near edges. Just below rim a trailed-on thread and on base two concentric coils, all of similar glass. Cut decoration. Round side a double frieze of thin oval facets; on base, between coils a row of similar facets and within inner coil four more thin oval facets surrounding a central circular one.

Fabric 2.

#### D. FLAT OR CONCAVE BASE, WITHOUT RING

Here are grouped three fragmentary specimens which have a flat or a concave base but no base ring, and therefore do not fit into any of the above types.

343. 24/5028 B/A Mich. 5832.

PL. XV

Pale green; base and part of side and rim, giving complete restoration; no weathering; material bad; bubbly.

H. 0.037 m. D. 0.064 m. A.T. 0.001 m.

Solid rim, folded over outward and downward. Convex sides with slight constriction near rim. Base very thick, with a slight kick in the centre made with a reamer. Pontil technique.

Fabric 8.

344. 26/B 9 P/Q and Q/C Mich. 6104 and 6105.

PL. XV

Colourless with greenish tinge; fragment of rim and side (P/Q) and of bottom and side (Q/C), almost certainly from same bowl though they are not contiguous; no weathering; material good; few bubbles.

D. 0.078 m. A.T. 0.001 m.

Hollow rim, folded over inward and downward. Sides straight and tapering to where they curve in toward base. Base probably flat or concave without a base ring.

Fabric 2 (?).

345. 26/B 49/G Mich. 6138.

PL. XV

Colourless with greenish tinge; base complete, some fragments of rim and side; frosted; material good; few bubbles.

H. 0.042 m. D. 0.162 m. A.T. 0.001 m.

Rounded rim, slightly thickened. Sides very slightly concave and sloping inward towards base. Base very thick in centre, flat below, convex above. Pontil technique.

Fabric 2.

#### E. RIMS FROM BOWLS OF UNCERTAIN SHAPE

Here should be grouped some fragments of rims from bowls which do not seem to fit into any of the previous groups. Some of them are perhaps from shallow bowls, but the majority are from deep bowls. Better-preserved examples are required before the shapes can be fully restored.

346. 26/B 4 E/G Mich. 6091.

PL. XV

Colourless with greenish tinge; no weathering; material fair; few bubbles and some streaky impurities.

D. 0.068 m. A.T. 0.0015 m.

Thick, rounded rim, with slight bend inward. On exterior, a coil of similar glass about 0.01 m. below rim, well fused in.

Fabric 2.

347. 26/BS 1/J Mich. 6149.

PL. XV

Colourless with greenish tinge; no weathering; material fair; few bubbles and no impurities.

D. 0.075 m. A.T. 0.0013 m.

Shape as no. 346, but no coil.

Fabric 2.

348. 26/B 17 G/E Mich. 6113.

PL. XV

Colourless with greenish tinge; no weathering; material good; a few pin-prick bubbles.

D. c. 0.11 m. A.T. 0.001 m.

Thick, rounded rim bent over slightly outward. Thin coil on exterior about 0.01 m. from rim.

Fabric 2.

349. 26/B 4 D/R Mich. 6090.

PL. XV

Colourless with greenish tinge; no weathering; material good; a few pin-prick bubbles.

D. c. 0.11 m. A.T. 0.001 m.

Shape as no. 348, but two coils close together on exterior.

Fabric 2.

350. 26/B 4 D/R Mich. 6090.

PL. XV

Colourless with greenish tinge; frosted; material good; a few pin-prick bubbles.

D. c. 0.18 m. A.T. 0.0015 m.

Thick, rounded rim, well outsplayed. Sloping sides. Perhaps from a shallow bowl. Coil of similar glass, well fused in, c. 0.015 m. from rim on exterior.

Fabric 2.

351. 25/249/K Mich. 6038.

PL. XV

Colourless with green tinge; no weathering; many bubbles and impurities.

D. 0.158 m. A.T. 0.001 m.

Thick, rounded rim, bent outward. Faint carination in side about 0.02 m. down. Probably from a shallow bowl.

Fabric 2 or 3 (?).

352. 27/B 118 E/H Mich. 6163.

PL. XV

Colourless with greenish tinge; frosted; a few pin-prick bubbles; many black impurities on rim.

D. 0.158 m. A.T. 0.001 m.

Thick, rounded rim, well outsplayed. Sides slightly convex and tapering downward. Spiral coil on exterior, c. 0.01 m. from rim, in places single and in places double.

Fabric 2.

353. 24/138 A/D Mich. 5701.

PL. XV

Colourless with greenish tinge; strain-cracked, dulled; material good.

D. 0.074 m. A.T. 0.0025 m.

Well-outsplayed rim with polished edge. Sides concave. Two horizontal wheel cuts at rim, below which a series of small oval facets sloping to right; below these, a single wheel cut; below again, a second series of small oval facets, sloping to left; below them another wheel cut.

Fabric 1.

354. 25/5048/LI Mich. 6064.

PL. XV

Colourless with greenish tinge; no weathering; material good.

D. c. 0.10 m. T. at rim 0.0055 m. T. near base 0.002 m.

Rim cut off square, with slight bevel at outer edge. Sides strongly convex, thick near top but thinning out toward bottom. Decoration of horizontal wheel cuts outside: near rim, one alone; below that a group of ten, and below again, a group of nine, the outside cuts being deeper and broader than the inner ones in each group.

Fabric 2.

## CLASS IV

### BOWLS ON STEM

ALL vessels of the shape of open dishes or bowls which stand on stems (whether tall or short) rather than on base rings or rounded bases have been grouped in a separate class, which would therefore include parallels, if such occurred, for all of the shapes in the three foregoing classes. But no examples of stemmed dishes or plates occur in Roman glassware,<sup>1</sup> so that only two broad divisions remain:

- A. Shallow bowls on stem, parallel to class II;
- B. Deep bowls on stem, parallel to class III.

Specimens are rare, both in Egypt and elsewhere, and it has not seemed advisable to elaborate further subdivisions.

Of group A only two complete examples (but of two distinct shapes) and a few fragments of stems have been found at Karanis. Edgar publishes an example with vertical sides and sloping bottom from the Fayûm,<sup>2</sup> and there are two examples of the same type in the Metropolitan Museum (Egyptian Department, nos. 40-1), and another in the British Museum (from the Fayûm, bought in 1891). Of the other type, that with sides and bottom in a continuous curve, Edgar lists no example, but there is one from Karanis in Cairo, found after his catalogue was published.<sup>3</sup> Other examples may be seen in the Wilbour collection in Brooklyn,<sup>4</sup> and in the Kaiser Friedrich Museum, Coptic Section.<sup>5</sup> A third type, not hitherto found at Karanis, which has a very shallow, bell-shaped contour, is represented several times in the Wilbour collection in Brooklyn, for example, nos. 378-9, and 383 (Fig. 2, h, j, k).<sup>6</sup>

Of group B there are only fragmentary specimens in this collection, all of the type with rounded rim and a cut-out in the side just below. This type is represented in other collections of Roman glass by one bowl only, which is in Wainwright's Karanis hoard.<sup>7</sup> Two

<sup>1</sup> A possible exception is a circular dish of early fine ware on an elaborate stem, restored, but without full evidence, by Froehner, *Gréan Cat.*, no. 275, pl. xxxiii, 4.

<sup>2</sup> Edgar, *Cat.*, no. 32444.

<sup>3</sup> No. J 41070, found in 1909; see App., p. 312.

<sup>4</sup> No. 372; part of a hoard found in a jar at Edfu in 1885; see also pp. 96-7 above.

<sup>5</sup> Wulff, no. 1202 (not illustrated).

<sup>6</sup> Part of the Edfu hoard; see note 4 above.

<sup>7</sup> No. J 47100 c; Wainwright, type 9 D, p. 83, pl. xxxvii.

other types also occur, parallel respectively to III A i (b) 1 and III A iii (a). Of the first of these, which has a bell-shaped contour and folded rim, there are two examples in Cairo,<sup>1</sup> one in the British Museum (from the Fayûm, bought in 1891), one in the Victoria and Albert Museum (no. C 166. 1932), one in the Musée Guimet (from Antinoë, 1902), one in the Metropolitan Museum (Egyptian Department, no. 42), and several, e.g., nos. 362, 365, and 382, in the Wilbour collection in Brooklyn.<sup>2</sup> Of the second, which has a bell-shaped contour and rounded rim, Edgar lists no example, but there are four specimens in Cairo acquired more recently,<sup>3</sup> another is in the Askren collection,<sup>4</sup> and a fifth is in the Petrie collection in University College, London.

All these vessels, both those in group A and those in group B, belong either to fabric 4 or to fabric 5, and are of late date, probably fourth to fifth century. Not one has been found in a distinctly early house.

Outside Egypt this class is even rarer. Kisa gives four type-drawings belonging to it, F 334-5 and G 422 and 426, but the last two of these are certainly taken from Edgar's catalogue. F 335 is taken from a bowl of marbled glass in the Niessen collection:<sup>5</sup> there is no clue to show whence F 334 comes. Morin-Jean does not list the type at all, so that the presumption is that it is not found on Gallic sites. A small dark blue vase in the Slade collection,<sup>6</sup> from Cologne, has a body like that of the *terra-sigillata* form Dragendorff 27, but stands on a stem, and fragments of similar bowls in early fine ware are in the Gréau collection in the Metropolitan Museum. Two examples from Tyre in the de Clercq collection<sup>7</sup> have hemispherical bodies and resemble no. 356 in general shape. Another stemmed bowl from Tyre is in the British Museum, bought in 1898. It is of green glass, and has an elaborate, knobbed stem.

<sup>1</sup> Edgar, *Cat.*, no. 32443 (no provenance), and Inv. no. J 46455 (from Karanis; see App., p. 312). It is worthy of mention that contemporary parallels in basket-work to this shape are known from Egypt. There is a good example made of plaited papyrus in the Musée Guimet, Paris, which was found at Antinoë in 1900.

<sup>2</sup> Part of the Edfu hoard; see p. 128, note 4.

<sup>3</sup> Three in the hoard published by Wainwright, nos. J 47094 e, 47099 i, 47105 k (the last of dark blue glass); Wainwright, types 9 A-C, p. 83, pl. xxxvii; also one from another Karanis hoard, no. J 46454; see App., p. 312.

<sup>4</sup> Mich. 5028; see App., p. 320.

<sup>5</sup> Niessen *Cat.*, no. 10, pl. i (coloured); Kisa, fig. 211.

<sup>6</sup> No. S 218 in the British Museum; *Slade Cat.*, p. 35.

<sup>7</sup> De Ridder, nos. 388-9, p. 200, pl. xx.

As to the origin of the type, the Niessen and Slade specimens show that it was known in the early part of the Imperial period. Like so many other shapes of dishes and bowls it was probably copied from metal originals, for a bronze bowl in the Niessen collection<sup>1</sup> is very similar in shape to no. 356. Parallel shapes also occur in *terra sigillata*, but only rarely.<sup>2</sup>

#### A. SHALLOW BOWLS

Two complete examples, both with folded rims, and numerous stem fragments occurred. Fragments of rims and sides were probably also common, but they would be indistinguishable from fragments of bowls of class II of the same fabrics.<sup>3</sup>

**355. 28/c 42 F/L** Donor.

Greenish yellow; intact; usage scratches, no weathering; material bad; full of bubbles and impurities; blowing spirals very noticeable.

H. varies 0.062–0.07 m. D. varies 0.134 m–0.138 m. A.T. 0.001 m.

Hollow rim folded outward and downward. Sides vertical. Bottom slopes down toward stem. Junction of sides and bottom curved and almost rectangular. Stem thick and formed by twisting. Wide concave base, flattened with modelling tool.

Criss-cross slanting impressions on upper side. Pontil technique.

Fabric 4.

**356. 28/c 42 J/P** Mich. 5916.

PLS. IV and XV

Yellow; intact; patches of iridescence; material fair; some bubbles and some bad impurities.

H. 0.078 m. D. 0.135 m. A.T. 0.0015 m.

Hollow rim, bent slightly inward and folded outward and downward. Sides and bottom form an unbroken convex curve. Stem as no. 355.

Fabric 4.

Among the numerous examples of stems of this type two cobalt specimens should be noted:

**357. 27/230 E/U** Mich. 6152.

24/4008 B/G Mich. 5442.

<sup>1</sup> *Niessen Cat.*, no. 3772, pl. cxix. The catalogue says 'die Zusammengehörigkeit (i.e., of the bowl and stem) scheint nicht ganz sicher', but even if they do not belong together they must both belong to bowls of this type.

<sup>2</sup> See Oswald and Pryce, *Terra Sigillata*, pl. lxix, 1–3 (no. 1 = Drag. 50), and an example in Oxford, no. 1872. 1386 (from Naples).

<sup>3</sup> Compare class II A i, pp. 70 ff.

## B. DEEP BOWLS

Fragmentary examples only, all of the type with rounded rim and a cut-out in the side just below.<sup>1</sup>

358. 24/137 D/AD Mich. 5540.

PLS. IV and XV

Olive green; fragment of rim, side, and base, about half of bowl; no weathering; bubbly and full of impurities; large blob of unfused sand in the stem, which has probably been the cause of the clean vertical fracture.

H. 0.053 m. D. at cut-out 0.09 m. A.T. 0.0015 m.

Rounded rim, below which a tubular roll has been formed by cutting out during the blowing process: this roll is not symmetrical, being much wider on one side than on the other. Squat, thickish stem formed by twisting. Concave base, flattened out by modelling tool. Well-marked slanting impressions on upper side. Pontil technique.

Fabric 5.

359. 26/BS 1/J Mich. 6149.

PL. XV

Pale green; fragment of rim and side; no weathering; bubbly, with impurities.

H. of side 0.04 m. A.T. 0.0015 m.

Rounded rim with tubular fold below: here the roll is more carefully made and shows the true shape intended in the last example.

Fabric 5.

360. 26/B 74/K Mich. 6144.

PL. XV

Greenish yellow; part of side, stem, and base; no weathering; bubbly.

D. of body 0.065 m. A.T. 0.002 m.

Shape as no. 358.

Fabric 5.

361. 26/B 50 B/F Mich. 6139.

A fragment like no. 360, green. Fabric 5.

Bases of similar bowls have been found, among which may be mentioned:

28/B 114 D\*/X. Greenish colourless. Fabric 3.

28/C 47 B/E. Brown. Fabric 5. Two examples.

<sup>1</sup> The parallel type of bowl in class III has not so far occurred in this collection, but there is an example in Cairo from Karanis (no. J 45774); see App., p. 312. See also Kisa, forms G 413-14; Morin-Jean, form 85; and Niessen Cat., nos. 919-20, pl. 50.

## CLASS V

### BEAKERS AND GOBLETS

**I**N class V are included all vases which are too deep to be called bowls, and yet are distinct from the jars of class VIII, because they have wide mouths and have very little, if any, trace of a neck.

Most of these vases were probably used as drinking cups,<sup>1</sup> but the two terms, 'beaker' and 'goblet,' are employed in order to suggest that the types were not exclusively used for drinking.<sup>2</sup> The goblets of group B were probably used thus, and only thus: on the other hand, there is definite evidence that some of the beakers of group A i were used as toilet-vases or kohl-vases.<sup>3</sup>

The class is divided into two groups, therefore:

- A. Beakers;
- B. Goblets;

and a third group, C, contains some types which probably belong to this class, though the complete shape is doubtful. The distinction between groups A and B is perhaps an arbitrary one: yet the vases of the first are, on the whole, smaller and have straighter and more vertical sides than those of the second, and in practice it will be found that, in Egypt at least, the types belonging to each group are quite distinct.

Subdivisions are based on rim technique and decoration, but since so few complete specimens have been found, these should be considered provisional, and further finds may necessitate a rearrangement.

The beakers, group A, are very uniform. The most marked difference is seen in the presence or absence of thumb indents on the sides. All have vertical or almost vertical sides, usually slightly but never strongly curved. Many of them have a more or less marked neck constriction just below an outsplayed rim. Others have no constriction but merely an outbent rim. They are, for the most part, small, though the base-ring vases, division i (a), are large and heavy, and

<sup>1</sup> In this respect they are like the parallel vases on stems of class VII.

<sup>2</sup> Archaeologically the term 'beaker' has come to be used for any kind of deep, wide-mouthed vase.

<sup>3</sup> Eye-sticks were found with no. 365; see p. 143 below.

some of the thumb-indent beakers of divisions ii and iii are quite tall in comparison to their diameter.

Their decoration, if any, is simple, and consists of added coils, raised ribs, or horizontal wheel cuts or incisions. Not one has a wheel-cut pattern.

The vases of division i (a) stand apart. They are of fabric 4, and were all found in top-layer houses. They must, therefore, be of Constantinian date or later. The position of complete examples on other sites would suggest a date in the late fourth or in the fifth century for them. Of the rest, the majority come from B-period houses of 1926, or from B- or C-period houses of 1927 and 1928, only seven being from the top layer. These considerations, taken in conjunction with the fabric of the vases—they belong without exception to fabric 1, 2 or 8—leave no doubt that the types are early ones, of the second and third centuries, which ceased to be made after the Constantinian epoch. The few fragments found in the top layer are certainly survivals. The vases with rounded or polished rims, divisions i and ii, are of better technique than those with unworked rims of division iii, but, as all the types seem to be parallel in date,<sup>1</sup> the former must represent the more expensive wares, the latter the cheaper. When the coloured wares came into vogue, these beakers, apart from the rare vases of i (a), died out, to be superseded possibly by some of the jars of class VIII.

Few examples of these group-A beakers have come from other sites in Egypt. Three large beakers on base rings of the type of division i (a) have been found at Badari,<sup>2</sup> and there is an example without provenance in Philadelphia.<sup>3</sup> A beaker of similar shape is in the Louvre,<sup>4</sup> but it has a greater constriction toward the top of the sides and a greater bulge toward the bottom. Of the type with rounded rim and tubular base (division i (b)) only one other example can be quoted, that in the Askren collection.<sup>5</sup> The beaker of similar shape published by Edgar<sup>6</sup> is of green glass and has a solid base ring. It

<sup>1</sup> One or two examples, which, though almost colourless, are of more bubbly glass and of poorer technique than the ordinary specimens of fabric 2, may perhaps be later.

<sup>2</sup> Brunton, *Qau and Badari*, iii, 28, pls. xlix, 12-14, 1, 6, and li, 4. No. 5200 is greenish, 5298 is green, and 5515 is pale green with blue coil. The excavator suggests a date c. 400 for all three specimens. The first and third are now in the British Museum, the second is in Kyoto.

<sup>3</sup> No. E 15804; green glass with blue coil.

<sup>4</sup> Inv. 980; greenish glass. H. 0.08 m. G.D. 0.11 m. D. mouth 0.08 m. From Egypt. <sup>5</sup> Mich. 5213; see App., p. 320.

<sup>6</sup> Edgar, *Cat.*, no. 32467; bought in 1887.

therefore belongs to the well-known Syrian type (*v. infra*) and as it was acquired by purchase and has no provenance attached, it may well be of Syrian origin. Of the same type, but with flattened or concave base and no ring—a type not represented in this collection—there is again one example in the Askren collection,<sup>1</sup> ten are in Edgar,<sup>2</sup> and yet another is in the Petrie collection in University College, London. Some others in Toronto may be of Egyptian origin, and one in the British Museum (Franks collection, 1878) is said to come from Egypt.

Specimens belonging to division ii are still rarer. There is one in Edgar<sup>3</sup> of colourless glass with a series of horizontal wheel cuts at the rim, and one with tubular base ring and thumb indents was found in the Karanòg cemetery.<sup>4</sup> This shape persisted into early Arab times, as is evidenced by two colourless beakers with cut decoration, one in the Victoria and Albert Museum and one in the British Museum. The first (Fig. 3, d)<sup>5</sup> has a central frieze consisting of two standing doves (?) separated by two circles, and, above and below, pairs of horizontal cut lines. The rim is missing. This beaker illustrates well the difference between the cut glass of Roman and early Arab workmanship, for the technique here, though better than that of the latest scratched Roman work, is not so refined as that of the best Roman. At the same time the design of the birds is reminiscent of later work.<sup>6</sup> The second<sup>7</sup> bears a geometrical design in panels, again reminiscent of later styles.<sup>8</sup>

Here also should be mentioned an important vase found at Faras by the Oxford Expedition to Nubia in 1912, and now in Oxford.<sup>9</sup>

<sup>1</sup> Mich. 5214; see App., p. 320.

<sup>2</sup> Edgar, *Cat.*, nos. 32458-9, 32463-6, 32468, 32470-2; of these, four (nos. 32458, 32463, 32465, 32468) are from Mit Rahineh, the others have no provenance attached.

<sup>3</sup> Edgar, *Cat.*, no. 32469, no provenance.

<sup>4</sup> Woolley and MacIver, *Karanòg*, p. 73, pl. xxxix: now in Cairo, no. J 40091.

<sup>5</sup> No. c 98. 1929; formerly in the Fouquet and Grüneisen collections.

<sup>6</sup> See Lamm, *Mittelalt. Gläser*, p. 154, pl. lviii, 2, who dates it to the ninth century, and compares it with *ibid.*, pl. lxii, 24.

<sup>7</sup> Bought in 1887, from Medinet Abu.

<sup>8</sup> See Lamm, *ibid.*, p. 152, pl. lvi, 2, who dates it to the eighth century.

<sup>9</sup> No. 1912. 1137; *Liv. Ann.*, xi, 263, pl. 51, 22:

Greenish; broken and mended, parts missing; greyish black enamel-like weathering over all.

H. 0.12 m. D. 0.065 m. A.T. rim 0.002 m. A.T. body 0.001 m.

Rim knocked off and smoothed: sides taper slightly downward: base flat with raised ring on under side: body mould-blown (marks of mould absent) with raised decoration of alternate drops and small circles in five registers, quincunx fashion.

No other examples are known from Egypt or Nubia, but the type is not rare elsewhere.<sup>1</sup>

The cheaper type of beaker with unworked rim and flat or concave base, was, however, commoner. Edgar has no examples, but Petrie found two examples at Hawara,<sup>2</sup> one with and one without horizontal wheel incisions; Woolley and MacIver found one with thumb indents in the Karanòg cemetery;<sup>3</sup> and there are others almost certainly from Egypt in the Chicago University Oriental Institute and in Toronto. In the Musée Guimet there is a group of four plaited papyrus holders for beakers of this type and also a fragmentary beaker with thumb indents. These were all found together in the 'tomb of Thaïas' at Antinoë by Gayet in 1900-1. It is interesting to note, on this evidence, that these fragile beakers were probably kept (if they were not actually used) in such protective holders. One example of the same shape of beaker but with a coil base is in the Petrie collection in University College, London.

All these types can be paralleled by finds from other provinces. Large, heavy beakers like those of division i (a) have been found on western sites, one of yellowish glass from Amiens, for example, being now in the British Museum (bought in 1875). And a similar but smaller type with rounded rim and a solid base ring is very common in late Romano-Syrian bluish green ware: there are examples in most collections.<sup>4</sup> It is also known in the west, but is not so common there.<sup>5</sup>

The parallel type without a base ring is rarer, but eastern examples can be quoted from the Niessen collection,<sup>6</sup> and in the west specimens have been found in a Roman cremation-burial at Girton, Cambridge,<sup>7</sup> and elsewhere.

The Egyptian types with polished rim, flat or concave bases, and

<sup>1</sup> Compare, e.g., Morin-Jean, form 104, p. 139, fig. 186 (Avignon, no. 1000), and others from Pompeii quoted *ad loc.* The finding of the present specimen in Nubia suggests an Alexandrian, or at least a Syrian and not a western locality as the place of manufacture of the group.

<sup>2</sup> Petrie, *Roman Portraits*, p. 20, pl. xv.

<sup>3</sup> Now no. 7354 in Philadelphia; Woolley and MacIver, *Karanòg*, pl. xxxix.

<sup>4</sup> Compare, e.g., in Oxford, Fortnum collection G 26-8, from Tyre; *Niessen Cat.*, no. 1086, pl. lii; Toronto, nos. 1782-3, 1806-7, &c.

<sup>5</sup> Compare Kisa, forms E 301, 322, and Morin-Jean, form 72. There are examples in Cologne, including an important specimen with fine snake-thread decoration and thumb indents, no. 25. 769 (Fremersdorf, *Denkmäler*, pl. xxiv), and another with net decoration in relief (Kisa, fig. 98).

<sup>6</sup> Nos. 1083 a and 1091, pls. xlvi and lii respectively.

<sup>7</sup> Hollingworth and O'Reilly, *Anglo-Saxon Cemetery at Girton*, p. 32, pls. xi-xii.

wheel-cut decoration cannot be paralleled absolutely either in Syria or in the west, but numerous very similar types are known, at least in the west. Compare, for example, Kisa's forms E 294-6; a beaker in the Niessen collection<sup>1</sup> with geometrical decoration, and similar beakers in Bonn<sup>2</sup> and Amiens;<sup>3</sup> and the many examples of beakers with figure scenes in cut or scratched technique.<sup>4</sup> The same type, but with a tubular base ring, is also known, for example one with cut geometrical decoration now in Cologne.<sup>5</sup>

The coarser beaker (division iii) with unworked rim and flattened or concave base was extremely common all over the Empire from c. 200 onward. The shape of its body varies considerably from that of a very tall beaker to that of a squat,<sup>6</sup> almost bulbous one, and its sides may be concave, straight, or convex. The type is represented in Morin-Jean's list by forms 74, 77, 104-5, and 112,<sup>7</sup> and in Kisa's by forms E 281, 288, 290, and F 369. The decoration is of various kinds, most of which are found equally in the east and in the west. Some are decorated with wheel incisions only;<sup>8</sup> some have green, yellow, or blue blob-decoration;<sup>9</sup> some have thumb indents;<sup>10</sup> some have been blown into moulds, with honeycomb or other patterns;<sup>11</sup> others, finally, are quite plain.<sup>12</sup> No example with a coil base like the University College beaker (p. 135) is known from outside Egypt.

The goblets of group B belong to three main types, (a) with a low

<sup>1</sup> Niessen *Cat.*, no. 327, pl. xxvi.

<sup>2</sup> Nos. A 884 and cxvii; Lehner, *Führer*, i<sup>2</sup>, 78 (vitrine 4).

<sup>3</sup> No. 988; Morin-Jean, fig. 317.

<sup>4</sup> E.g., *Arch. Anz.*, 1927, 183, figs. 38-9, from Sepino, central Italy (Bacchic scenes); Cologne, nos. 527 and 658 (from Cologne); Straub, *Strasbourg*, pp. 91-6, pls. i-iii (beaker with figures of Moses and Abraham).

<sup>5</sup> No. 637, from Cologne; Fremersdorf, *Röm. Gläser*, fig. 34.

<sup>6</sup> Some of the more squat types are very similar in shape to the deep bowls; see p. 104 above.

<sup>7</sup> See also Morin-Jean, figs. 186-7, 252, 254, 300 a, and 315.

<sup>8</sup> No. 1848 (squat) and 1879 (tall) in Kiev Museum; no. 815 (squat) in the Niessen collection (*Cat.*, pl. xliv); Morin-Jean, fig. 315; and Cesnola, *Atlas*, iii, pl. lxxxi.

<sup>9</sup> No. 1850 (squat) in Kiev Museum; nos. 135-6 in the Niessen collection (*Cat.*, pl. ix, coloured).

<sup>10</sup> Several examples in the Niessen collection (*Cat.*, nos. 257-8, 268-70, &c., pls. xliv and xlvi). On some of these thumb-indent beakers there is a more or less pronounced base ring of the pushed-in variety. See also Cesnola, *Atlas*, iii, pl. lxxx.

<sup>11</sup> Morin-Jean, figs. 252 and 254; and no. 17292 in Bonn. The last example is of yellowish green glass, of so similar appearance to fabric 5 that it may be an Egyptian export.

<sup>12</sup> One, probably of Syrian provenance, in Mayence (Coptic collection), and another found in the Sportpark, Köln-Müngersdorf, and now in Cologne (Fremersdorf, *Röm. Gläser*, p. 12; *id.*, *Der römische Gutshof Köln-Müngersdorf*, p. 95, pl. 51, 1). Like two other glasses from the same find, the metal of this last is very similar to fabric 3, and may well be an Egyptian export; see pp. 49, 65, and 71 above.

pad base, (b) with a high pad base and handles (?), and (c) with rounded base. Of (a) two fine, complete specimens occurred, and the type is therefore well attested. Of (b) no complete example was found, but a restoration of the type has been attempted based on specimens found elsewhere (pp. 151-2 below). Of (c), again, only fragments have been found at Karanis, but finds elsewhere leave no reasonable doubt that such fragments come from goblets with rounded bases.

Within these divisions the examples only differ in decoration. In division (a) two techniques occur. First, wheel-cut lines and patterns, usually of the finest workmanship; and, second, raised ribs. The decoration in (b) is of the raised-rib type and in (c) it consists of cut or scratched lines or facets.

All the examples of division (a) belong to fabric 1 or 2. The two complete examples, nos. 408-9, were found in a hole in a window-sill in the west wall of the room C 45 F, covered by a small pot-lid which was held down by mud plastering. They were obviously a highly prized possession and hidden there for production on important occasions only. The house is of the late third to early fourth century. The next most considerable fragment, no. 410, comes from one of the latest houses on the Kôm, and most of the others are from fourth-century rooms. But their manufacture, like that of the other types of colourless cut ware, must be dated much earlier, probably in the second or early third century. Two fragments were found in houses B 2 and B 3 of 1926, and these finds alone are sufficient to prove an early date for all the rest, which must have been preserved as heirlooms. As drinking cups they were probably superseded, in general use, by quite a new type, the cups on stem of class VII A, which is the ordinary type found in the fourth- and fifth-century houses at Karanis, and perhaps also by the jars of class VIII B, though by reason of the shape of their rims these are not very suitable for drinking purposes.

The fragments in division (b) all belong to chalice-like vases with egg-shaped bodies and high, spreading bases. If the handle, no. 425, belonged to a vase of this type, as seems most likely, then the vases were probably two-handled.<sup>1</sup> Apart from one small fragment of fabric 7, all are of one or other of the two colourless fabrics. Three

<sup>1</sup> There is a two-handled chalice of very similar shape and decoration (but applied and not pinched out) and of the same colourless glass in Cologne (no. 939); *Bonner Jahrbücher*, 114.5 (1906), 406, pl. xxiii, 34.

of these fragments were found in B-period houses of 1926, so that, although the rest came from later houses and some even from the top layer, the type must be of the second or early third century.

The examples in division (c) all come from houses of the Constantinian or later periods, and belong either to debased fabric 2 or to one of the three table wares. Their manufacture dates probably to the late third or early fourth century, when the blowers were producing more careless work. The scarcity of fragments shows that the shape never can have been common. The coloured cup on stem, class VII A, had a longer and wider popularity.

Goblets like these from other sites in Egypt are very rare. Of the pad-base variety only one complete piece and a doubtful fragment have come to hand. The complete example is of fabric 2 and was found by Petrie in a fourth-century (?) tomb at Hawara.<sup>1</sup> It is a tall goblet on a high pad base, with a central frieze of geometrical cuts flanked above and below by horizontal wheel cuts and raised ribs (Fig. 3, j). Though akin to group (b) it is in reality quite different from anything found hitherto at Karanis.<sup>2</sup> The fragment referred to is in the British Museum<sup>3</sup> and seems to be from the side of a goblet on a pad base. It is of fabric 1 and bears a floral (?) design in polychrome paint.

Of the type with rounded base a fragmentary example, which was found during the Oxford Excavations at Faras in Nubia, bears a geometrical pattern in late scratched technique;<sup>4</sup> a single fragment of another bearing traces of a geometrical design and an inscription . . EN . . . in the same late technique came from the Egypt Exploration Fund excavations at Oxyrhynchus in 1904 and is now in the Victoria and Albert Museum (no. 692.1905). A third example, also fragmentary, is in the Petrie collection in University College, London.

Outside Egypt both the pad-base and rounded-base types are fairly common. There is a large series of greenish or colourless goblets with cut decoration and low pad base, examples of which have been found on widely scattered sites in the east and west and

<sup>1</sup> Petrie, *Hawara*, p. 12, pl. xx, 6; now in Manchester, no. 2082.

<sup>2</sup> An analogous form is known amongst snake-thread glasses in the west, e.g., Kisa, fig. 128 d (now in Namur), though on that example the body is squatter and more bulgy and the neck is more constricted than on this Hawara piece. For the body compare also the beaker from Berslin, Carniola, p. 141 below.

<sup>3</sup> From Oxyrhynchus, 1902.

<sup>4</sup> *Liv. Ann.*, xii, 83, pl. xxvi, 8. Grave 1504.

which are so similar not only in shape and technique but actually in fabric to nos. 408 and 409 that they must come from the same workshops—almost certainly Alexandrian—as those pieces. From the east there is an example from Curium in Cyprus in the British Museum (Fig. 3, a) bearing on the side five rows of diamond facets in quincunx formation. From the west two typical examples<sup>1</sup> may be quoted: one in the Vom Rath collection, now in the Antiquarium, Berlin<sup>2</sup> (Fig. 3, b), which has a frieze of vine-tendrils and grape-clusters in finest cut technique that is highly reminiscent of the treatment of the same motive on Romano-Egyptian textiles; and another in Cologne<sup>3</sup> (Fig. 3, c) bearing as a central design four rows of diamond facets just like those of the Curium example. A slightly different rim (plain and not outsplayed) and base (flatter and smaller) are to be seen on an example found as far north as Sojvide, in Gotland,<sup>4</sup> suggesting western manufacture under eastern influence, rather than direct importation from Egypt. There are other examples which are perhaps more akin to no. 410, for they have moulded rims. Illustrative of this group is a beaker published by Oelmann<sup>5</sup> and now in Trèves (no. G 197) and also a fragmentary specimen, half-extant, from London in the British and Mediaeval Department of the British Museum. There is a smaller fragment of a very similar goblet in the same Department, also from London. Relief festoons of added threads like those on no. 419 are to be seen on a goblet (no. I c 3417) in the Prehistoric Museum, Berlin, from Bügen, near Neustettin. Finally, a blue glass goblet probably from Syria in the de Clercq collection<sup>6</sup> is of similar type but with mould-blown decoration. Its decorative frieze represents Pan and maenads in a Bacchic dance. The pad base was, of course, added after the body had been blown into a mould.

The goblet with high pad base and relief festoons also may be closely paralleled from western sites. The best example is one found in the Mehlemstrasse, Cologne, in 1904, and is now preserved in

<sup>1</sup> For others, compare one in Mayence, found at Cologne (formerly in the Evans collection); and one in the British and Mediaeval Department, British Museum, from Barnwell, Cambridgeshire, formerly in the Slade collection (no. s 171, *Slade Cat.*, p. 28, fig. 38). Both these have facet decoration. Another with horizontal-line decoration is in Marseilles (no. 479, from Arles).

<sup>2</sup> No. 30220. 182; Kisa, *Vom Rath Cat.*, no. 182, pl. xviii, 162.

<sup>3</sup> No. 23. 123; Fremersdorf, *Denkmäler*, pl. 38, 1.

<sup>4</sup> Described and figured by Almgren in Kisa, p. 906, fig. 377.

<sup>5</sup> Oelmann, *Kastell Niederbieber*, p. 8, fig. 1: Oelmann dates it c. 100.

<sup>6</sup> De Ridder, no. 277, p. 155, pl. xi.

Cologne.<sup>1</sup> It has a rounded, outsplayed rim with horizontal coil at the constriction, a convex-sided body, and a high pad base with rounded edge. There are two handles from rim to shoulder, with thumb-plates above, and on the body a wavy lozenge-pattern of added threads in five loops, with pinches in the field. It is of fabric 1 and there can be no doubt that it is of Egyptian origin. The Karanis fragments, so far as they go, are so similar that it has seemed legitimate to reconstruct their type from this piece. There is an exactly parallel goblet in the British Museum from Nervi near Bordighera (bought in 1887), also of fabric 1 and probably an Egyptian export. In Poitiers there is a similar goblet, found in that district; it is of colourless glass, but without handles, and with a polished, upright rim. Cologne no. 267 is a fragmentary example of the same type, but it apparently had no handles. A goblet in the Niessen collection<sup>2</sup> should also be mentioned, for it has a high pad base like the above specimens, though its body is more akin to group (a), having no handles and being taller and narrower than the Cologne and British Museum pieces.<sup>3</sup> An earlier, but allied type, is to be seen in the British Museum.<sup>4</sup> It is of colourless glass and polished all over. Its handles alone, which are flat on top and have thumb-plates, would prove that it was copied from first-century metal examples such as have been found at Boscoreale and elsewhere,<sup>5</sup> and it forms, therefore, a connecting link between those metal goblets and the later type of glass goblet with relief festoons.

There are other types of tall goblet on base ring which are far commoner, but as they are not found in Egypt they need not be described in detail here.<sup>6</sup> One only, Wiesbaden no. 2579, is deserving of special notice, for in all but shape—it is olla-shaped and not conical—it is a counterpart of nos. 408 and 409.

The goblet with rounded base appears commonly in other provinces, more particularly in the west, not only decorated, like the

<sup>1</sup> No. 939; *Bonner Jahrbücher*, 114/5 (1906), 406, pl. 23, 34; Morin-Jean, pp. 137-8, fig. 184; and Fremersdorf, *Röm. Gläser*, fig. 27.

<sup>2</sup> *Niessen Cat.*, no. 106, pl. xxvi.

<sup>3</sup> Conceivably the Karanis fragments, or at least some of them, belong to such a goblet rather than to the handled type. A similar piece is in the Gréau collection; Froehner, *Gréau Cat.*, no. 1229, pl. 231, 8 (no provenance).

<sup>4</sup> From Canosa, bought with the Slade bequest, 1871.

<sup>5</sup> Morin-Jean, pp. 137-8.

<sup>6</sup> See, e.g., Morin-Jean, forms 106 and 109-11, &c.; Kisa, forms E 284, 286, 298, 310, &c.; Fremersdorf, *Denkmäler*, pl. xliv (a typical Frankish type); and *Niessen Cat.*, pls. xi (122), xxv (153)—an interesting piece with *cabochons* cut in relief—, xlvi (several examples), and xliv (several examples).

Karanis examples, with cut or scratched designs, but also decorated with blobs, pinches, and so forth, or not decorated at all. The types found are well illustrated by Kisa's forms E 276-7 and 279-80 and by Morin-Jean's forms 77-8 and 80.

Many of the examples with cut decoration—more particularly those which are of good technique—are probably Alexandrian, for they have the same characteristics of style and fabric as some of the fragments catalogued from Karanis. Among such may be mentioned three fragmentary beakers found in London and now in the London Museum (nos. 28278-9, 28289), all of colourless glass and bearing well-cut geometrical designs; a complete specimen found at Berslin near Rudolfswert in Carniola, which is taller and narrower than any of the others here mentioned, and resembles in shape, but for the absence of a pad base, the beaker from Hawara in Manchester (Fig. 3, j, p. 138);<sup>1</sup> other western examples with good cutting in Cologne,<sup>2</sup> and in the Niessen collection;<sup>3</sup> and a similar goblet in the Louvre which was found at Kerch. As examples of this type with bad, scratchy cutting it will suffice to instance two, nos. 78 and 528 in Cologne, both found in the Cologne district. Amongst these vessels the variety with sharply constricted neck—like its counterpart among the deep bowls of III B ii (a)—is not found among the Karanis fragments or on other eastern sites and is therefore probably western. Illustrative of other types of decoration are goblets with blob-decoration from Rheims<sup>4</sup> and Cologne;<sup>5</sup> one from the Marne valley<sup>6</sup> with raised elongated drops; one from Neuville-le-Pollet<sup>7</sup> with pinches and indents; goblets of the type called *diatreta* with raised openwork decoration;<sup>8</sup> and others with thread and barbotine decoration.<sup>9</sup>

These goblets can be paralleled very closely in pottery from the eastern part of the Roman Empire. An example in Oxford which is

<sup>1</sup> Kisa, p. 633, fig. 242, and Kubitschek in *Jahr. d. K. K. Central.-Comm.*, I Bd. (Wien, 1903), 183-94, pl. ii. This example bears cut decoration in four friezes: (a) inscription ΚΑΙΛΕΩΠΑΣ = *καὶ ἐσ ἀπας* (?); (b) ivy leaves and fruit—the leaves are the same heart-shaped type as occur on the Hawara goblet; (c) fish-bone; (d) vertical facets. The rim is rounded and there is a pontil mark on the base.

<sup>2</sup> No. 519, from Mauspfad, 1893; nos. 293 and 24. 400, both from Cologne.

<sup>3</sup> Niessen Cat., nos. 328-31, pl. xxvi; nos. 328-9 and 331 are from Cologne; no. 330 is probably so.

<sup>5</sup> Niessen Cat., nos. 135-9, pl. xii.

<sup>7</sup> Morin-Jean, p. 228, fig. 310.

<sup>9</sup> Niessen Cat., no. 95, pl. xxvi; a fine goblet in the Louvre with festoons of vine-tendrils in coloured barbotine, Kisa, p. 468, fig. 112; and one from Bonn with late snake-thread decoration, *ibid.*, p. 459, fig. 127.

<sup>4</sup> Morin-Jean, p. 223, fig. 301.

<sup>6</sup> Morin-Jean, p. 226, fig. 306.

<sup>8</sup> Morin-Jean, p. 232, fig. 312-13.

plain except for horizontal ribbing comes from Cythnos in the Aegean.<sup>1</sup> Among others one from Thera<sup>2</sup> may be mentioned. The Cythnos example was found in a mine-working, near a coin of Galienus, so that probably it dates c. 300.

The four fragments grouped under C are all colourless wares of the second or third century. What types of vases they belong to must remain uncertain until completer examples are found.

#### SKELETON CLASSIFICATION

##### A. Beakers

###### i. Rounded rim

- (a) Base ring
- (b) and (c) Tubular and coil base

###### ii. Polished rim

Flat or concave bases

- 1. Horizontal wheel-cut lines; thumb indents
- 2. Horizontal wheel-cut lines; no thumb indents

###### iii. Unworked rim

Flat or concave bases

- 1. Plain, or with horizontal wheel incisions; thumb indents
- 2. Plain, or with horizontal wheel incisions; no thumb indents
- 3. Raised ribs on body; thumb indents
- 4. Raised ribs on body; no thumb indents

##### B. Goblets

All probably had polished rims

###### (a) Pad base

- 1. Wheel cuts
- 2. Relief festoons

###### (b) 'Chalice' type, with high pad base and handles (?)

Relief festoons

###### (c) Rounded (?) base

Wheel cuts

##### C. Uncertain fragments

#### A. BEAKERS

##### I. ROUNDED RIM

The base-ring type, listed as (a), is sufficiently distinct, despite the fragmentary condition of the Karanis specimens, but, in the absence of more trustworthy evidence than that of the present fragments, it has not been thought advisable to separate the tubular and coil-base types. Examples of a fourth type—with flattened base—are known from elsewhere in Egypt (p. 134 above).

<sup>1</sup> No. 1931.419. It has an everted rim, bulging body and slightly flattened base.

<sup>2</sup> Dragendorff, *Thera*, ii, 285, fig. 480 h.

## (a) BASE RING

Three fragmentary specimens occurred which between them give a complete restoration. Complete examples are extant from other Egyptian sites (p. 133 above).

362. 25/219 A/E<sup>1</sup> Mich. 6028.

Greenish yellow; five fragments of rim and one fragment of body, with horizontal coil; no weathering, bubbly, with some impurities.

D. rim c. 0.10 m. A.T. 0.001 m.

363. 25/219 A/E<sup>2</sup> Mich. 6028.

Yellow with streaky green to yellow coil; base and lower part of sides up to coil almost complete, no fragment of rim; no weathering; bubbly, with some impurities.

D. body c. 0.10 m. A.T. 0.0015 m.

364. 25/249/M.

Yellow with greenish yellow coil; several fragments of rim and side, some with coil attached; no weathering; bubbly, with some impurities.

D. c. 0.12 m. A.T. 0.001 m.

Restoration of type of nos. 362-4:

PL. XV

H. c. 0.17 m. D. rim 0.109 m. D. body 0.111 m.

Rounded rim set vertically on sides. Body roughly cylindrical: slight concavity in sides near the top and a bulge at the bottom before they start to curve in toward base. Pad base, concave with slight kick, and, on upper side, criss-cross slanting impressions. Pontil technique. On body, about half-way down, a fairly thick horizontal coil.

Fabric 4.

## (b) and (c) TUBULAR AND COIL BASE

Only one complete specimen, no. 365, with tubular base, occurred; all fragments are listed.

365. 27/B 121 K/K Cairo J 52761 A.<sup>1</sup>

PLS. IV and XV

Colourless with greenish tinge; intact, except for one crack in side; no weathering; material good, but many pin-prick bubbles and a few small impurities on rim.

H. 0.06 m. D. 0.036 m. A.T. 0.0005 m.

Rounded rim bent out slightly from constriction at neck. Sides widen out gradually to greatest diameter near base, and from there bend in again sharply toward base. Tubular base ring. Pontil mark on top of pointed reamer mark. Just below neck constriction a triple coil of similar glass.

Fabric 2.

<sup>1</sup> This vase, when found, contained two bone pins, L and M (Pl. xv), 0.104 m. and 0.114 m. long, respectively. L was intact, M was broken in two. Both were stuck vertically into the beaker through a makeshift stopper of cloth. The beaker when found was full of sand and rubbish, but all trace of the original contents was gone. However, as the cloth stopper did not fit tight when the rubbish holding it was removed, it seems probable that the vase was not empty when abandoned. The bone pins are both coated with salty deposit.

**366.** 28/B 163 A\*/G Mich. 6020.

Fragment of rim as for no. 365. Fabric 2.

**367.** 28/136\*/FI.

Another rim fragment, as for no. 365 but larger and with a single band of applied thread at neck. Fabric 2.

**368.** 27/C 53 K/G Mich. 6192.

PL. XV

Colourless with greenish tinge; whole of base and part of sides, rim missing; traces of iridescence; material good, but some small bubbles.

D. base 0.025 m. A.T. 0.001 m.

Shape as no. 365.

Fabric 2.

**369.** 28/B 127 C/J.

A base fragment as no. 365. Fabric 2.

**370.** 28/B 138 F/E Mich. 6229.

PL. XV

Colourless with greenish tinge; two fragments, one of rim and one of base, which probably belong together; no weathering; some pin-prick bubbles.

H. as restored 0.078 m. D. 0.07 m. A.T. 0.0008 m.

Rounded rim, no neck constriction. Sides straight, tapering downward to base. Base slightly concave, thin coil at edge, where it joins sides. Double band of very thin thread trailed on, 0.015 m. from rim.

Fabric 2.

**371.** 26/B 9 Q/C Mich. 6105.

PL. XV

Colourless with greenish tinge; base only; frosted; some pin-prick bubbles.

D. 0.049 m. A.T. inside coil 0.0025 m.

Base of vase as no. 370, slightly concave, with thin coil at edge. Pontil technique.

Fabric 2.

**372.** 24/169 Q/E Mich. 5459.

PL. XV

Colourless with greenish tinge; complete rim with part of side; no weathering; some pin-prick bubbles.

D. 0.058 m. A.T. 0.0007 m.

Rounded rim bent out from slight neck constriction. Sides curve slightly outward from neck constriction to greatest diameter. Single band of thin thread c. 0.02 m. from rim.

Fabric 2.

**373.** 26/B 4 D/R Mich. 6090.

26/B 9 R/W Mich. 6106.

26/B 11 C/A Mich. 6109.

26/B 21 P/B Mich. 6116.

27/B 118 E/H Mich. 6163.

28/B 167 A/R Mich. 6232 (with double neck coil).

28/C 107 A/K.

All fragments of rim and side as no. 372. D. varies 0.06-0.12 m. Fabric 2.

**374.** 26/B 2 N/M Mich. 6079.

PL. XV

Colourless with greenish tinge, turquoise blue coils; fragment of rim and part of side; no weathering; a few pin-prick bubbles.

D. 0.064 m. A.T. 0.001 m.

Rounded rim, bent out slightly from neck constriction; two coils, a thick one at the tip of the rim, and a thinner one just below neck constriction.

Fabric 2.

375. 26/B 20 G/C Mich. 6115.

Greenish colourless; fragment of rim; no weathering; bubbly.

D. 0.06 m. A.T. 0.001 m.

Rounded rim, bent out slightly from neck constriction. No added coils.

Fabric 8.

## II. POLISHED RIM

Only fragmentary examples occurred, and all are listed. All have flat or concave bases, without rings or coils.

### 1. Horizontal wheel-cut lines; thumb indents

376. 26/B 25 L/R Mich. 6121.

PL. XV

Colourless with greenish tinge; complete base, one fragment of rim and one of side; no weathering; some bubbles in base.

H. 0.142 m. D. 0.082 m. A.T. 0.001 m.

Rim outsplayed and polished. Sides taper slightly downward to near base, where they bend outward again, forming with base a torus moulding. Four large, roughly rectangular thumb indents reaching from neck to base, giving vase a four-sided appearance. Thick, concave base, pressed in, without kick. At rim, four horizontal wheel cuts; at neck, two more.

Fabric 2.

377. 26/B 9 R/W Mich. 6106.

Colourless with greenish tinge; fragment of rim; frosted; pin-prick bubbles.

D. c. 0.08 m. A.T. 0.0015 m.

Shape as no. 376. Two wheel cuts at rim.

Fabric 2.

378. 28/B 132 A\*/H.

A fragment as no. 377. Fabric 2.

379. 26/BS 1/J Mich. 6149.

Colourless with greenish tinge; fragment of rim; frosted; material good.

D. roughly as for no. 376. A.T. 0.0015 m.

Shape as no. 376. One wheel cut at rim, another at neck.

Fabric 2.

380. 24/124 E/V Mich. 5846.

Colourless with greenish tinge; fragment of rim; no weathering; material good.

D. 0.09 m. A.T. 0.001 m.

Shape as no. 376. Group of eight wheel cuts at rim, two deeper ones at neck.

Fabric 2.

381. 26/B 3 E/V Mich. 6085.

Colourless with greenish tinge; fragment of rim; no weathering; pin-prick bubbles.

D. roughly as no. 380. A.T. 0.0005 m.

Shape as no. 376. Series of ten faint wheel cuts at rim and neck, with one deeper one immediately below.

Fabric 2.

382. 25/295/B Mich. 6053.

Colourless with greenish tinge; fragment of rim; frosted, with milky weathering causing pits; very bubbly.

D. 0.105 m. A.T. 0.001 m.

Shape as no. 376. One wheel cut at rim, two more at neck.

Late fabric 2.

*2. Horizontal wheel-cut lines; no thumb indents*

383. 24/130 C/P Mich. 5400.

PL. XV

Colourless with greyish tinge; fragment of rim and side; frosted; pin-prick bubbles.

D. 0.104 m. A.T. 0.0025 m.

Rim outsplayed and polished. Straight sides tapering downward. Two horizontal wheel cuts at rim, two more c. 0.02 m. below.

Fabric 2.

384. 24/169 AB/L Mich. 5410.

PL. XV

Colourless with greenish tinge; fragment of base;<sup>1</sup> no weathering; material good.

D. 0.075 m. A.T. base 0.0035 m.

Base almost flat, but with slight concavity at centre and slight convexity outside that.

Sides vertical. One wheel-cut circle underneath, 0.01 m. from rim and two more, together, at bottom of side.

Fabric 1 or 2.

385. 25/171 A/C Mich. 6023.

PL. XV

Colourless with greenish tinge; fragment of rim; frosted; pin-prick bubbles.

D. 0.08 m. A.T. 0.001 m.

Shape as no. 383. Four wheel cuts at rim; another at neck.

Fabric 2.

386. 26/CS 1/H Mich. 6151.

As no. 385 exactly.

387. 28/BS 160/J11.

Similar to no. 385, but one wheel cut at rim and one at neck.

388. 28/B 156 A/G.

Similar to no. 385, but a group of eight wheel cuts at rim.

389. 25/171 A/C Mich. 6023.

Colourless with greenish tinge; fragment of side; frosted; material good.

Dimensions roughly as nos. 383 ff.<sup>2</sup> A.T. 0.001 m.

Shape as no. 383. Three groups of wheel cuts on side, four, three, and two together.

Fabric 2.

390. 26/B 3 E/U Mich. 6085.

Fragment of side as no. 389, but only two wheel cuts near top.

<sup>1</sup> It is likely that this base, with the preceding fragment of rim and side, gives the complete restoration of the type.

<sup>2</sup> But they are not the same as those of the fragment from the same room, no. 385.

## III. UNWORKED RIM

Examples were numerous, but all fragmentary. Only a small selection are listed. All have flat or concave bases, without rings or coils.

1. *Plain, or with horizontal wheel incisions; thumb indents*

391. 24/138 c/L Mich. 5541.

PLS. IV and XV

Greenish colourless; one half extant; dirty, no weathering; bubbly, with blobs of stone.

H. 0.075 m. D. rim 0.08 m. A.T. 0.0005 m.

Outsplayed, unworked rim. Sides taper slightly downward. Four large thumb indents in body, making vase roughly four-sided. Base flat. Series of horizontal wheel incisions at rim.

Fabric 8.

392. 28/B 138 F/H.

Fragments of rim, side, and base as no. 391, greenish colourless. Fabric 8.

393. 26/B 4 D/R Mich. 6090.

PL. XV

Dull green; base complete and many fragments of side and rim; no weathering; very bubbly.

H. c. 0.116 m. D. 0.066 m. A.T. side 0.0002 m. A.T. base 0.0015 m.

Outsplayed, unworked rim. Sides taper slightly downward to near base, where they bend outward again, forming with base a torus moulding. Four large thumb indents in body, making vase roughly four-sided. Base concave, but without kick. No wheel incisions.

Fabric 8.

394. 24/169 c/I Mich. 5542.

Greenish colourless; base and part of sides; frosted; material fair; not many bubbles.

D. base 0.049 m. A.T. sides 0.001 m. A.T. base 0.005 m.

Rim lost, sides taper slightly downward and bend sharply outward at bottom to form a torus moulding with base. Six equal thumb indents, set vertically from neck to base. Very thick base, pressed in to slight concavity below.

Fabric 8.

395. 28/B 115\*/VI.

A base fragment of a vase as no. 398.

396. 27/C 55 D/Y Mich. 6196.

PL. XV

Colourless with olive green tinge; base and lower part of sides; no weathering; material fair, but many pin-prick bubbles.

D. base 0.053 m. A.T. side 0.001 m. A.T. base 0.005 m.

Very thick base, flattened out by pressure. Sides vertical with eight thumb indents.

Bulge or torus at bottom, as before.

Late fabric 2.

397. 28/B 172/M.

Base fragment of a vase as no. 400, but with eleven (or twelve?) thumb indents. Greenish colourless. Fabric 8.

Of other base fragments of this type of beaker with four thumb indents the following should be mentioned:

398. 27/C 54 E/OI Mich. 6193.

26/B 7 L/F Mich. 6098.

Colourless with greenish tinge; deep kick in base. Fabric 2.

399. 25/5026 E/E Mich. 6063.

26/B 10 G/H Mich. 6108.

24/142 A/H Mich. 5438.

Colourless with greenish tinge; base only slightly concave, without kick. Fabric 2.

400. 26/B 2 AB/G Mich. 6083.

26/B 2 X/N Mich. 6081.

Olive green; base only slightly concave, without kick. Fabric 8.

401. 26/B 2 H/YI Mich. 6078.

26/B 7 L/F Mich. 6098.

Dull green; base only slightly concave, without kick. Fabric 8.

## 2. Plain or with horizontal wheel incisions; no thumb indents

402. 26/B 2 AC/A Mich. 6084.

Greenish colourless; base complete and two small side fragments; frosted; material fair; few bubbles.

D. base 0.065 m. A.T. side 0.001 m. A.T. base 0.002 m.

Rim lost. Sides vertical, bending out sharply at bottom to form torus moulding with base. Cylindrical body with no thumb indents.

Late fabric 2 (?).

## 3. Raised ribs on body; thumb indents

403. 26/B 3 L/J Mich. 6086.

PL. XV

Colourless with greenish tinge; fragment of rim and side; spots of milky weathering; pin-prick bubbles.

D. 0.064 m. A.T. 0.0008 m.

Sharply outsplayed, unworked rim. Pronounced neck constriction, from which sides bulge out to greatest diameter. Four thumb indents. Traces of S-shaped raised ribs on side. Bottom lost.

Fabric 2.

404. 26/B 21 P/B Mich. 6116.

Colourless with greenish tinge; fragment of rim and fragment of side, not contiguous; milky weathering; pin-prick bubbles.

D. c. 0.07 m. A.T. 0.0005 m.

Shape as no. 403.

Fabric 2.

405. 28/156\*/Q1 Mich. 6224.<sup>1</sup>

PL. XV

Greenish colourless; fragment of base and side; no weathering; bubbly.

D. at top 0.066 m. A.T. side 0.001 m. A.T. base 0.004 m.

Rim and upper part of body lost. Greatest diameter about centre of vase, from which sides curve inward to base. Base concave with faint kick. Thin, S-shaped raised ribs on body from below neck (?) to just above base.

Late fabric 2.

406. 26/B 3 E/U Mich. 6085.

Fragment of body as no. 405.

*4. Raised ribs on body; no thumb indents*

407. 26/B 36 C/G Mich. 6132.

Colourless with greenish tinge; fragment of side only; no weathering; pin-prick bubbles.

D. c. 0.06 m. A.T. 0.001 m.

Sides taper downward, no trace of rim or base. Plain beaker, circular in section, with no thumb indents. Raised spiral ribs on body.

Fabric 2.

*B. GOBLETS*

All probably had polished rims.

*(a) PAD BASE*

*i. Wheel cuts*

Two complete examples and numerous fragments occurred; all are listed.

408. 27/C 45 F/F Mich. 5933.

PLS. IV and XV

Colourless with greenish tinge; intact; badly strain-cracked, slightly dulled on rim; material good; only a few bubbles.

H. 0.147 m. D. 0.092 m. A.T. 0.0012 m.

Rim outsplayed and polished. Straight sides tapering downward to near base, where they become convex. Pad base with ring in cyma-recta profile. Edge of ring polished. Base flat. At lip a series of horizontal wheel incisions: 0.02 m. below, two horizontal wheel cuts; and 0.035 m. from top of base ring two more horizontal wheel cuts.

Fabric 2.

409. 27/C 45 F/G Cairo J 52758.

PLS. IV and XV

Colourless with greenish tinge; intact; badly strain-cracked; material good; few bubbles.

H. 0.175 m. D. 0.109 m. A.T. 0.002 m.

Shape as no. 408, but base ring larger in comparison and more outsplayed. Two horizontal wheel cuts at rim, two more 0.002 m. lower down, and two more

<sup>1</sup> This, with no. 403, gives a complete restoration of the type.

0.04 m. from top of base ring. Between the second and third groups five horizontal rows of cut oval facets set in quincunx formation, each facet averaging  $0.006 \times 0.017$  m.

Fabric 2.

**410.** 25/344/N Mich. 6057 and Cairo—one fragment.

PL. XV

Colourless with greenish tinge in fracture; many fragments of rim and side, no trace of base; one fragment dulled, with traces of iridescence, the rest covered with a powdery, iridescent, milky film, easily flaking off;<sup>1</sup> material fair.

D. 0.092 m. A.T. 0.003 m.

Plain, polished rim. Sides taper downward with faint convex curve. The exterior of the vase covered with a finely cut pattern from rim downward, consisting of a raised horizontal ridge at rim, another just below, and a third 0.017 m. below that; these form a border to the main design which is composed of lozenges, truncated at top and bottom and set in quincunx formation with, as a top row, a series of alternately large and small ovate figures.

Fabric 1.

**411.** 26/B 3 E/U Mich. 6085.

PL. XV

Colourless with greenish tinge; fragment of side; badly strain-cracked, frosted; material good.

H. of fragment 0.075 m. A.T. 0.003 m.

Fragment of side, convex, with cut decoration. At top, groups of oval facets in interlaced diamond formation, twelve to each diamond. Within each facet an incised twirl and between the tips of the diamonds other incised ornaments. Below this pattern, two horizontal wheel cuts. Below again, a horizontal row of vertical oval facets, broad and narrow alternately.

Fabric 1 or 2.

**412.** 24/147/G Mich. 5397.

PL. XV

Colourless with faint greenish tinge; fragment of side; no weathering; material good.

H. of fragment 0.045 m. A.T. 0.0035 m.

Small fragment of side of vase, probably as no. 410, with cut pattern of diamond facets in quincunx formation.

Fabric 2.

**413.** 26/B 36 C/G Mich. 6132.

PL. XV

Colourless with greenish tinge; fragment of side; strain cracks, milky weathering in patches; material fair; some bubbles.

A.T. 0.002 m.

Fragment of curved lower part of side with decoration of horizontal and slanting wheel-cut lines.

Fabric 2.

**414.** 26/B 28 H/E Mich. 6128.

As no. 413 exactly.

**415.** 28/C 35 C/G Mich. 6233.

Colourless with greenish tinge; fragment of lower part of side; no weathering; material fair.

<sup>1</sup> This is an interesting example of the effect of environment in causing different stages of weathering; compare no. 215.

Dimensions roughly as no. 408.

Shape as no. 408. Where side begins to curve in toward base, a group of six horizontal wheel cuts.

Fabric 2.

**416.** 28/B 127 G/H.

A fragment as no. 415, but plainer, with only one horizontal wheel cut. Fabric 2.

**417.** 25/5048/L1 Mich. 6064.

Colourless with greenish tinge; fragment of base and lower part of sides; frosted: material good.

Dimensions as no. 408. A.T. side 0.005 m. A.T. base 0.002 m.

Shape as no. 408. Two horizontal wheel cuts *c.* 0.02 m. from top of base ring.

Fabric 1 (?).

**418.** 26/B 2 H/Y1 Mich. 6078.

Colourless with greenish tinge; fragment of base and lower part of sides; some spots of iridescence; material fair.

Larger than no. 417. A.T. 0.002 m.

From a squatter and broader vase than no. 417, otherwise very similar. Horizontal row of wheel incisions on lower part of body.

Fabric 2.

## 2. *Relief festoons*

Only one fragmentary specimen occurred.

**419.** 28/130\*/M Mich. 6223.

PL. XV

Colourless with greenish tinge; base and lower part of sides; traces of milky weathering; pin-prick bubbles.

D. at top of base ring 0.053 m. A.T. 0.001 m.

Upper part of body lost. Sides taper downward to base ring in convex curve. Pad base with ring in cyma-recta curve. Edge of ring polished. Base slightly convex.

On sides a pattern of relief festoons in lozenge or lattice formation.

Fabric 2.

### (b) 'CHALICE' TYPE WITH HIGH PAD BASE AND HANDLES (?)

#### *Relief festoons*

Only fragmentary specimens occurred; all examples are listed.

**420.** 24/148 A/U Mich. 5871.

PL. XVI

Colourless with greenish tinge; fragment of body and base; no weathering; material good; some pin-prick bubbles.

D. of base 0.016 m. A.T. near stem 0.004 m. A.T. sides 0.002 m.

Sides of body convex and sloping well in toward stem. Solid stem, well pinched in, from which the base is outsplayed in the shape of a hollow cone, so that the vase has the shape of an hourglass. Edge of base knocked off, and probably polished. On the body a decoration of relief festoons in lattice formation, bounded at the bottom by raised horizontal scalloping.

Fabric 2.

421. 24/5016 H/E Mich. 5812.

Colourless with greenish tinge; fragment of sides and base; frosted; material good; some pin-prick bubbles.

Dimensions roughly as no. 420.

Shape and decoration as no. 420.

Fabric 2.

422. 26/BS 1/J Mich. 6149.

26/B 2 AC/A Mich. 6084.

Fragments of sides of vases as no. 420. Fabric 2.

423. 26/BS 1/J Mich. 6149.

A very small fragment, as no. 420, but dark blue glass. Fabric 7.

424. 28/B 127 A\* G Cairo J 54776.

PL. XVI

Colourless with greenish tinge; fragment of body and base; no weathering; material good.

D. in centre of body 0.24 m. A.T. side 0.003 m. A.T. near stem 0.007 m.

Shape as no. 420, but thicker and heavier, and with broader stem. The festoons are here V-shaped with rounded ends and not linked up by a raised scalloped border at the bottom.

Fabric 1.

425. 25/200/A Mich. 6026.

PL. XVI

Colourless with greenish tinge; handle; no weathering; bubbly.

H. 0.057 m. Sectional D. 0.005 m.

Curved handle of drawn glass, circular in section, ending above and below in a pinched wing or thumb-piece. At each end of the handle are remains of the vase to which it was attached, and on the lower one of these are fragments of two raised ribs. The handle probably belongs to an example of the foregoing type of 'chalice,' and a similar handle has been restored on the drawing (PL. XVI).

Fabric 2.

(c) ROUNDED (?) BASE<sup>1</sup>

*Wheel cuts*

Only the following fragmentary specimens occurred:

426. 27/C 65 H/B Mich. 6213.

PL. XVI

Greenish colourless; fragments of rim and side; dirty brown stains, no weathering; material bad and bubbly.

D. c. 0.09 m. A.T. 0.002 m.

Polished rim, bent very slightly inward. Sides taper downward in convex curve.

Near rim two horizontal rows of wheel incisions, below which a decoration of oval facets, in rows, some vertical and some horizontal.

Debased fabric 1 or 2.

427. 27/C 65 H/B Mich. 6213.

Colourless with greenish tinge; fragment of lower part of side, not from same vase as no. 426; no weathering; bubbly, with blobs of stone.

<sup>1</sup> Until a completer specimen is found, it is not certain what variety of base should be attributed to these fragments. However, on the analogy of similar types found elsewhere, they probably had rounded bases without a ring or coil.

A.T. 0.002 m.

Decoration of cut oval facets in horizontal bands; poor, late work.

Debased fabric 1 or 2.

428. 25/5058 A/C Mich. 6066.

PL. XVI

Colourless with greenish tinge; fragment of side; no weathering; material poor and bubbly.

H. of fragment 0.06 m. A.T. 0.002 m.

Wheel-cut decoration of a frieze of diamonds enclosing alternately a grid pattern and a circular facet; poor, late work.

Debased fabric 2.

429. 25/249/K Mich. 6038.

Greenish colourless; fragment of side; no weathering; material poor and bubbly.

A.T. 0.003 m.

Wheel-cut decoration of straight and curved lines and circular oval facets. Pattern uncertain.

Debased fabric 2.

430. 26/BS 3/B Mich. 6150.

PL. XVI

Greenish colourless; fragment of lower part of side; no weathering, material poor and bubbly.

A.T. 0.003 m.

Scratched decoration consisting of fragmentary leaf pattern.

Fabric 3 (?).

431. 25/5056/F Mich. 6065.

PL. XVI

Yellowish green; two fragments of side; no weathering; material very bad and bubbly.

A.T. 0.002 m.

Scratched decoration of lines and facets within squares. Pattern uncertain. Extremely poor work.

Fabric 5.

### C. UNCERTAIN FRAGMENTS

The four following fragments probably belong to beakers or goblets:

432. 26/B 21 P/B Mich. 6116.

PL. XVI

Colourless with greenish tinge; fragment of rim and side; spotted, milky weathering; material good.

D. c. 0.09 m. A.T. 0.001 m.

Fragment of rim and side of a tallish vase. Polished rim. Sides slightly convex. For the rest, shape uncertain. Two sets of wheel incisions near rim; two more c. 0.02 m. lower down.

Fabric 2.

433. 26/B 12 D<sup>1</sup>/B Mich. 6110.

PL. XVI

Colourless with greenish tinge; fragment of side; milky weathering in spots; bubbly.

D. body c. 0.055 m. A.T. 0.001 m.

Fragment from centre of body of a tallish vase. Sides taper slightly downward. Scratched decoration: zigzag pattern of parallel lines with two oval facets in each angle. Above, a horizontal line.

Late fabric 2.

434. 27/B 118 A/J Mich. 6162.

PL. XVI

Colourless with greenish tinge; fragment of side and bottom of body; traces of milky weathering; material good; very few bubbles.

D. at carination 0.068 m. A.T. 0.0015 m.

Fragment of side and bottom of body of a strongly carinated, tallish vase, on a base ring or perhaps on a stem. For the rest, shape uncertain. Groups of horizontal wheel cuts on side; on extant fragment, two groups of two each.

Fabric 2.

435. 25/249/K Mich. 6038.

A smaller fragment, as no. 434.

## CLASS VI

### CONICAL LAMPS

THE sixth class is a very homogeneous group of plain conical glasses. They all have unworked, polished, or rounded rims, and sides tapering downward to a base which is small and more or less pointed. Decoration, when it occurs, is simple, and consists of wheel cuts or incisions, blue blobs, and fused-in threads or coils.

These vases were undoubtedly used as lamps.<sup>1</sup> Most of them still have an oily feel, and some have burnt and oily stains inside.<sup>2</sup> One fragment of a base, from the group of fragments numbered 26/BS 2/D, contained a residue of contents which on analysis showed traces of oil. That they were occasionally used for other purposes is shown by the fact that no. 460, when found, contained four dice. It had been used as a dice-box, but that usage must have been accidental and secondary. The number of fragments of the type that have been found precludes the idea that they can all have been dice-boxes.

For use as lamps they would first be filled nearly to the top with water, upon which the oil and wick could float. They would then be set in a stand<sup>3</sup> or hung from the ceiling in groups in a bracket or a chandelier. It is a primitive type of lighting, but one not much more advanced is used even to-day to light churches in Egypt. In this modern type the only improvement made on the Karanis usage

<sup>1</sup> For a full discussion of these vessels and of the reasons for suggesting that not only the eastern but even some of the western examples are lamps, see Crowfoot and Harden, 'Early Byzantine and Later Glass Lamps,' *Journ. Eg. Arch.*, xvii, 196–208 (specially pp. 197 and 200–2), pls. xxviii–xxx. An apology is due to Mr. Edgar from the authors of that article for having failed to credit him with priority in identifying these glasses as lamps. It is true that in his catalogue proper he calls them merely 'vases' (see *ibid.*, p. 197), but in his introduction he puts forward the suggestion that they were lamps. Here, too, it may be permitted to correct a slip, *ibid.*, p. 203, note 8, where Farah is inadvertently stated to be a place-name instead of, apparently, the name of the person from whom the vase was acquired.

<sup>2</sup> This seems to be true even on examples found outside Egypt, for there is a coloured reproduction of one in the Morin-Jean collection which is said to come from north Gaul (Morin-Jean, pl. x) on which oily internal stains are distinctly indicated. M. Morin-Jean has been kind enough, in a letter, to confirm this impression by examining the original.

<sup>3</sup> Some wooden tripods were found at Karanis which might have served as stands for these vases, but until one of the stands is found in conjunction with one of the vases, this attribution must remain dubious.

is the provision of a small, vertical glass tube rising from the base, inside, to hold the wick.<sup>1</sup>

In the following Catalogue these lamps have been divided according to differences in the formation of the base into four main groups. It must be emphasized, however, that these differences are very minor ones, and that all the examples are in essence homogeneous. The four groups are:

- A. Lamps with solid-pointed base;
- B. Lamps with hollow, flattened base;
- C. Lamps with solid base, and base coil;
- D. Lamps with base knob.

Some interesting fragments are appended in a fifth group, E, which almost certainly belong to one or other of the four previous groups, though in each case not enough of the vase is preserved to warrant an attribution to any definite group.

Further subdivisions are based on rim technique and decoration.

Most of these vases, if not all, certainly belong to fabric 3, 4, or 5. Those with rounded rims (A ii and C) belong to fabric 4, and those with unworked rims belong either to fabric 3 or to fabric 5.<sup>2</sup> The three base-knob fragments are doubtful. Two of them may be fabric 2 or 3 and the other is probably fabric 4. The fragments in group E all belong to one of the three table wares (fabric 3-5).

The type is certainly late. The majority of the complete examples have been found in B- or C-period houses of 1927 and 1928. Fragments are exceedingly common in these houses and in the top-layer houses above them, but no specimens, either complete or fragmentary, were found in the earliest B-period houses of 1926. The type must have grown up about the beginning of the fourth century and was very common from the Constantinian period onward; thereafter, to judge from the number of fragments discovered, the glass lamp must have rivalled in popularity the ordinary terra-cotta variety.

These conical vases were fairly common in Egypt. Examples of most of the above types are included in Edgar's catalogue,<sup>3</sup> but

<sup>1</sup> A fuller discussion of the methods of use of these and other types of glass lamps will be found in Crowfoot and Harden, pp. 206-8.

<sup>2</sup> No. 436 is of such bubbly material that it may belong to fabric 8. More probably it is merely a specimen of fabric 3 from a very bad pot.

<sup>3</sup> The full list of Edgar's examples by types is: A i a, 32494; A i b, 32491-3; A i c, none; A ii, 32483-90, 32495-8, 32780 (from Karanis); B i a, 32479-82; B i b, 32487 (fragment); C i, 32485-6; C ii, 32483-4.

when that catalogue was compiled the Cairo Museum seems to have possessed only two examples (one a fragment) with decoration in added blue glass. This is probably pure chance, for at Karanis blue-blob examples are relatively much more common. Edgar also lists two specimens (both from Meir) of a variant hitherto unrecorded at Karanis, a base-coil type with unworked and not rounded rim (i.e., c i). In the Askren collection there are thirteen examples of these lamps,<sup>1</sup> Wainwright's Karanis hoard included twelve of various types,<sup>2</sup> there are nineteen<sup>3</sup> other examples in Cairo, and Petrie<sup>4</sup> publishes one specimen found at Saft-el-Henneh (Goshen). In the Metropolitan Museum there are four examples (Egyptian Department, nos. 47-50) of the A ii variety. Others of this same variety may be seen in the Berlin Antiquarium (Gans collection), in the Victoria and Albert Museum (Beck loan, no. 622), and in the British Museum (one from the Fayûm). Two examples in Oxford are both of A ii type, but with the addition of a spiral thread near the rim—again a variant not so far represented at Karanis. One (no. 1892. 1218) is of yellow glass with similar thread, the other (no. 1914. 631 from Harageh) is of yellow glass with blue thread.

Conical glasses like these are also found in other provinces of the Empire. For eastern instances compare Toledo no. 354. 8851, from Syria, of greenish colourless glass with a frieze of blue blobs in groups, bounded above and below by a wheel-cut line; two in the Berlin Antiquarium, from the Crimea, one without decoration, the other with three blue blobs, equidistant, near the rim; and one in the Louvre from Kerch with blue zigzag threads. One from Syria decorated in incised technique with a bird, a xp-symbol, and other ornaments is in the de Clercq collection,<sup>5</sup> and there is a plain example in the Metropolitan from Cyprus.<sup>6</sup> Of the base-knob type two Syrian examples can be quoted: one in the Louvre<sup>7</sup> is of greenish glass with polished rim, and bears, besides a blue base knob, a frieze of blue blobs in triangular groups of three round the body; and another is in the Gréau collection, now in the Metropolitan Museum.<sup>8</sup>

<sup>1</sup> Mich. 5082-94; see App., pp. 320-1.

<sup>2</sup> Wainwright, type 3, pp. 76-7, pl. xxxvii. The variants were A i a, J 47092 a-e; A i b, J 47101 e-h, 47105 d; B i b, J 47101 i, j.

<sup>3</sup> All acquired since Edgar's catalogue was published; see App., p. 313.

<sup>4</sup> Petrie, *Hyksos*, pl. xxxvii, B.

<sup>5</sup> De Ridder, no. 260, p. 143, pl. ix.

<sup>6</sup> Cesnola, *Atlas*, iii, pl. cvii, 1.

<sup>7</sup> MNC 1836, from Syria. H. 0.08 m. D. 0.072 m.

<sup>8</sup> Froehner, *Gréau Cat.*, no. 792, pl. cxxi, 1, from Sidon. This example bears a frieze in which single blobs alternate with groups of six in triangular formation.

Both these vases are wider and shorter than usual and form a half-way house between the ordinary conical type and the squat bowl-like form of Mich. 5120 (Fig. 3, g; App., p. 321). These pieces are closely connected with the Egyptian, not only in shape, but also in colour and ornament. They must have been made by workers who either influenced or were influenced by the Egyptian manufacturers.

From the west Morin-Jean lists two forms, no. 106 with a base, and no. 107 ending in what is almost a point. Kisa gives five variants, E 285 (with a base), and E 277, 315-16, and G 436 (ending in a point or flattened butt). Of these the type with a base, Morin-Jean form 106<sup>1</sup> and Kisa E 285, is not a true parallel to any of the Karanis pieces and is really nothing more than an elongated goblet, belonging rather to Class V. The others, however, deserve fuller consideration. Morin-Jean says of form 107:<sup>2</sup> 'Les verres coniques, très répandus dans tout le nord des Gaules, se rencontrent dans les tombes de la fin de l'Empire, et dans les sépultures franques du V<sup>e</sup> et du VI<sup>e</sup> siècles.' They are thus parallel in date to the Egyptian examples. Some are without decoration, others have added threads with or without mould-blown corrugations,<sup>3</sup> and others again are even more closely allied to the Egyptian pieces, for they bear barbotine blobs<sup>4</sup> or horizontal wheel incisions.<sup>5</sup> It would seem that the type was introduced into the west during the fourth century and that the first pieces made were direct copies of the eastern types, being plain or with wheel-incision and blue-blob decoration. Later, in Frankish times, the type achieved a wide popularity, but by then it had adopted new processes of decoration in keeping with the fashions of the time.<sup>6</sup>

<sup>1</sup> Morin-Jean, pp. 140-1, fig. 262.

<sup>2</sup> Morin-Jean, p. 141. He illustrates examples from Sablonnière, Aisne (fig. 189), and from Arcy-Sainte-Restitue, Aisne (fig. 344).

<sup>3</sup> For examples of this see Kisa, figs. 101-2 and type G 436. This type is specially common in Scandinavia, Kisa, p. 912, fig. 386. It is also common in Anglo-Saxon cemeteries in England, Baldwin Brown, *Arts in Early England*, iv, 486, pl. cxxvii (from High Down, Sussex), and p. 487, pl. cxxviii, 2 (from Alfriston, Sussex).

<sup>4</sup> E.g., an example from Deidesheim, Kisa, fig. 154: one in Strasbourg, Morin-Jean, fig. 300: one in the Morin-Jean collection in Paris, Morin-Jean, pl. x, opp. p. 280 (coloured).

<sup>5</sup> Kisa, *Vom Rath Cat.*, no. 82, pl. viii, 74.

<sup>6</sup> The type is also found occasionally in clay, e.g., one in St. Germain (Moreau Room) from Villa d'Ancy. The form was doubtless copied by the potters from the glass-workers, and not vice versa.

## SKELETON CLASSIFICATION

- A. Solid-pointed base
  - I. Unworked rim; no pontil technique
    - (a) No decoration
    - (b) Wheel incisions
    - (c) Wheel incisions and blue blobs
  - II. Rounded rim; pontil technique
    - None has any decoration
- B. Hollow, flattened base
  - I. Unworked rim, sometimes smoothed on edge; no pontil technique
    - (a) Wheel incisions
    - (b) Wheel incisions and blue blobs
- C. Solid base and base coil
  - I. Unworked rim—NO EXAMPLES
  - II. Rounded rim; pontil technique
    - Threads or coils
- D. Base knob
- E. Fragments of uncertain types, varying in decoration
  - (a) Wheel cuts
  - (b) Scratched circles
  - (c) Moulded decoration
  - (d) Marvered-in festoons
  - (e) Thumb indents

## A. SOLID-POINTED BASE

## I. UNWORKED RIM; NO PONTIL TECHNIQUE

The following complete examples occurred with varying decoration. Smaller fragments were found in great profusion.

## (a) NO DECORATION

436. 27/c 56 G/L Mich. 5928.

PLS. V and XVI

Pale green; intact; stained, no weathering; very bubbly and many impurities; blowing spirals very noticeable.

H. 0.203 m. D. 0.083 m. A.T. 0.001 m.

Unworked rim, bent outward from top of side. Sides taper downward with slight convexity. Solid-pointed base. No pontil technique. No decoration.

Fabric 3 or 8.

437. 25/113 E/K Mich. 5543.

Green; repaired but complete; dirty, no weathering; very bubbly but not many impurities.

H. 0.226 m. D. 0.095 m. A.T. 0.0013 m.

Shape as no. 436.

Fabric 5.

## (b) WHEEL INCISIONS

438. 28/158 B/A Mich. 5922.

PLS. V and XVI

Greenish colourless; intact; some stains, no weathering; bubbly with some impurities; blowing spirals.

H. 0.125 m. D. 0.063 m. A.T. 0.0007 m.

Shape as no. 436. Point of base flattened slightly by pressure. Three groups of horizontal wheel incisions near rim; four more groups together round centre of body.

Fabric 3.

439. 24/136 B/A Mich. 5544.

Green; intact; no weathering; bubbly.

H. 0.131 m. D. 0.078 m. A.T. 0.0015 m.

Shape as no. 436, but no convexity in sides. One group of horizontal wheel incisions near rim; two sets of three groups each lower down.

Fabric 5.

Several nearly complete but badly broken examples of this type were not retained.

## (c) WHEEL INCISIONS AND BLUE BLOBS

440. 24/137 D/x Mich. 5545.

PLS. V and XVI

Dark greenish yellow with blue blobs; small chip out of rim; no weathering; material fair; blobs bubbly.

H. 0.092 m. D. 0.068 m. A.T. 0.0025 m.

Shape as no. 436, but a much smaller vase, with more outsplayed sides. Point of base again flattened slightly by pressure. One group of wheel incisions near rim, and below them a horizontal frieze of blue blobs consisting of three small ones in a group and one large one, alternating, and each repeated three times.

Fabric 5.

441. 27/cs 63/A Mich. 5929.

Greenish colourless, with blue blobs; intact; stains inside, no weathering; bubbly with many sandy impurities; blowing spirals.

H. 0.135 m. D. 0.079 m. A.T. 0.001 m.

Shape as no. 436, but rim turns in at top.<sup>1</sup> About 0.02 m. from rim, two groups of wheel incisions, and 0.03 m. below them, one more group. Between these groups a horizontal frieze of blue blobs consisting of two large ones diametrically opposed with a row of five smaller ones on each side in between.<sup>2</sup>

Fabric 3.

442. 24/5021 F/g Mich. 5685.

Another fragmentary specimen of this type.

Among fragments of lamps bearing other patterns of barbotine decoration the following are worthy of mention. It is convenient to

<sup>1</sup> A fold or cut-out was made before the vase was knocked off the rest of the parison. In this example the severing has been made a little farther round the cut-out than usual.

<sup>2</sup> There are other smears of blue glass on the vase also, caused by careless working.

group them all together here, though some of them doubtless belong to the parallel type, Bib below. All are of yellow or greenish yellow glass, fabric 5.

**443.** 25/5093 E/D Mich. 6246.

Blue blobs in equal-armed-cross formation, a row of five horizontally crossed by a row of five vertically.

**444.** 24/4029 E/C Mich. 5652.

A blue zigzag line horizontally.

**445.** 24/101 J/V Mich. 5370.

A blue zigzag line horizontally with a blob in every alternate angle below it.

**446.** 24/4023 C/J Mich. 5644.

A blue zigzag line horizontally with a blob in every angle above it.

**447.** 24/136 M/I Mich. 5621.

A blue zigzag line horizontally with a straight blue line horizontally below it.

**448.** 24/5024 A/I Mich. 5863.

24/5012 F/I Mich. 5670.

Two blue zigzag lines crossed horizontally, forming a lozenge pattern.

## II. ROUNDED RIM; PONTIL TECHNIQUE

No example has any decoration. The following complete examples occurred. Small fragments of the type were very numerous.

**449.** 25/209 C/V Mich. 5546.

PLS. V and XVI

Sea green; intact; no weathering; bubbly, but no impurities.

H. 0.11 m. D. 0.055 m. A.T. 0.0008 m.

Rounded rim. Slightly convex sides, tapering downward to base. Solid-pointed base, with pontil technique.

Fabric 4.

**450.** 25/293 A/J Mich. 5547.

Yellow; intact; no weathering; bubbly, with some impurities; blowing spirals.

H. 0.115 m. D. 0.056 m. A.T. 0.0008 m.

Shape as no. 449. The pontil has left a trace of iron on the point of the base.

Fabric 4.

**451.** 28/C 42 F/G Mich. 5923.

Brownish yellow; small crack in side; no weathering; material as no. 450.

H. 0.108 m. D. 0.055 m. A.T. 0.0005 m.

Shape as no. 449.

Fabric 4.

**452.** 28/C 42 F/H Mich. 5924.

Greenish yellow; intact; no weathering; full of impurities; blowing spirals.

H. 0.11 m. D. 0.055 m. A.T. 0.0005 m.

Fabric 4.

453. 28/C 42 J/R Mich. 5925.

Olive green; intact; some oily stains; milky weathering in spots, chiefly on rim; bubbly, with impurities.

H. 0.109 m. D. 0.056 m. A.T. 0.0009 m.

Shape as no. 449.

Fabric 4.

454. 28/C 42 J/S Mich. 5926.

Brownish yellow; intact; traces of milky weathering; material as no. 453.

H. 0.105 m. D. 0.055 m. A.T. 0.0005 m.

Shape as no. 449, but sides rather crooked owing to irregular blowing.

Fabric 4.

## B. HOLLOW, FLATTENED BASE

### I. UNWORKED RIM, SOMETIMES SMOOTHED ON EDGE; NO PONTIL TECHNIQUE

The following complete examples occurred with varying decoration. Smaller fragments were found in great profusion.

#### (a) WHEEL INCISIONS

455. 27/C 45 A/B.<sup>1</sup>

PLS. V and XVI

Olive green; mended, not quite complete; no weathering; material clear but bubbly.

H. 0.133 m. D. 0.092 m. A.T. 0.0012 m.

Unworked rim bent outward from top of sides; smoothed on edge. Sides taper straight downward to near the base, where there is a slight concavity. Hollow base, flattened by pressure. No pontil technique. Three groups of horizontal wheel incisions near rim; three more groups 0.03 m. lower down; two more groups 0.05 m. below these.

Fabric 5.

456. 27/C 45 A/A.

Olive green; in many fragments, not quite complete; stains, no weathering; material as no. 455.

H. c. 0.18 m. D. c. 0.105 m. A.T. 0.001 m.

Shape and decoration as no. 455.

Fabric 5.

#### (b) WHEEL INCISIONS AND BLUE BLOBS

457. 27/C 45 A/F Mich. 5932.

PLS. V and XVI

Yellowish green with blue blobs; intact; no weathering; material poor; many large bubbles.

H. 0.208 m. D. 0.124 m. A.T. 0.002 m.

Unworked rim bent out from top of sides. Sides taper straight downward to near the base, where there is a slight concavity. Base flattened by pressure. No pontil technique. One group of horizontal wheel incisions just below rim and below that, sets of three, three, two, and two. Between the first and second of these sets

<sup>1</sup> This piece and the next, and the deep bowl no. 329, were all found together. On all three the rim has been smoothed by polishing.

Fragments which have a finely polished rim and good cutting instead of wheel incisions, and which perhaps belong here, were also found, group E a below.

a horizontal frieze of blue blobs consisting of two large blobs diametrically opposed, and, in between, two triangular groups of ten small ones each.  
Fabric 5.

**458.** 27/c 50 A/N Cairo J 52755.

Yellowish green with blue blobs; slightly chipped on rim; dulled in parts, but no weathering; material fair; blobs very bubbly.

H. 0.143 m. D. 0.085 m. A.T. 0.001 m.

Shape as no. 457. Two groups of horizontal wheel incisions 0.02 m. and 0.055 m. from rim respectively: between these a horizontal frieze of blue blobs consisting of two large ones diametrically opposed with two groups of five smaller ones in quincunx formation in between.

Fabric 5.

**459.** 27/B 121 K/N Mich. 5931.

Yellowish green with blue blobs; chipped on rim and large crack in side; stains on inside, no weathering; material as no. 458.

H. 0.18 m. D. 0.109 m. A.T. 0.001 m.

Shape as no. 457, but base slightly concave. Four groups of horizontal wheel incisions at intervals down vase; between the second and third groups a horizontal frieze of blue blobs consisting of one large one alternating with a triangular group of three small ones, each repeated five times.

Fabric 5.

**460.** 27/B 121 K/O Mich. 5930.

PLS. V and XVI

Yellowish green with blue blobs; chipped on rim and small crack in base; dirty outside but no oily stains, no weathering; material fair, but one large patch of bubbles near rim.

H. 0.163 m. D. 0.107 m. A.T. 0.001 m.

Shape as no. 457. Horizontal frieze of fifteen small and two large blue blobs, these latter diametrically opposed. Above and below this frieze faint traces of groups of wheel incisions.

Fabric 5.

Contents: four bone dice, P $\times$ 4.<sup>1</sup>

**461.** 25/260 E/L Mich. 5686.

A fragmentary specimen with decoration similar to that of no. 460. Fabric 5.

**462.** 25/122 H/C Mich. 5548.

Greenish yellow with blue blobs; in fragments, incomplete; one side iridescent;<sup>2</sup> material good; some bubbles.

H. 0.131 m. D. 0.092 m. A.T. 0.002 m.

Shape as no. 457. A group of horizontal wheel incisions near rim; lower down a broad horizontal wheel cut flanked on each side by a group of wheel incisions; below again, a horizontal frieze of blue blobs, one large one alternating with a triangular group of three smaller ones, each repeated three times; below, another group of wheel incisions.

Fabric 5.

<sup>1</sup> The glass was apparently used as a dice-box. As it has no oily stains, it may never have been used as a lamp. The dice are not perfect cubes though they were certainly meant to be cubic. They have numbers 1-6, 2-5, 3-4 as opposites. Each number-point consists of a dot within a circle (P 1) or a dot within two concentric circles (P 2-4).

<sup>2</sup> The vase lay on its side on a piece of cloth which has left the criss-cross mark of its fabric on this iridescent surface.

**463.** 24/4029 A/- Mich. 5549.

Greenish yellow with blue blobs; in many fragments, complete (?); no weathering; material as no. 462.

Dimensions roughly as no. 462.

Shape as no. 457. Horizontal frieze of equal blue blobs, flanked on each side by a group of wheel incisions.

Fabric 5.

Some of the fragments with variant decoration listed above under A i c might equally well belong here.

### C. SOLID BASE AND BASE COIL

#### I. UNWORKED RIM

No examples occurred.

#### II. ROUNDED RIM; PONTIL TECHNIQUE

##### THREADS OR COILS

Only two complete examples occurred; there were, besides, some fragments of base coils and some body fragments with decoration of trailed-on threads.

**464.** 28/C 42 J/T Mich. 5927.

PLS. V and XVI

Yellowish green with purple streak near rim; half of base coil missing; oily stains, iridescent patches; bubbly, with impurities.

H. 0.183 m. D. 0.079 m. A.T. 0.001 m.

Rounded rim. Straight sides tapering downward, but with slight convexity near base. On the base a solid coil of similar glass. Trace of pontil technique. About 0.02 m. from rim a double horizontal trailed-on thread, fused in.

Fabric 4.

**465.** 25/293 A/H Mich. 5550.

PLS. V and XVI

Brownish yellow, greenish base coil; intact; no weathering; bubbly with impurities; blowing spirals.

H. 0.185 m. D. 0.086 m. A.T. 0.001 m.

Shape as no. 464. Solid base coil of greenish glass. Pontil technique. Round the vase, near the rim, a zigzag trailed-on thread of similar glass, fused in.

Fabric 4.

### D. BASE KNOB

Of this type only the three following base fragments with knobs could be identified, though body fragments must have occurred:<sup>1</sup>

**466.** 25/4016/Q Mich. 6060.

PL. XVI

Colourless with greyish tinge; base fragment; no weathering; material good, but some pin-prick bubbles.

<sup>1</sup> A complete example, but much shallower than usual, is in the Askren collection, Mich. 5120 (Fig. 3, g); see App., p. 321. Other examples of knobbed lamps occur in Syria; see p. 157 above.

D. knob 0.011 m. A.T. side 0.0015 m.

Rounded base, fashioned below into an oval knob, the whole in one piece. No pontil technique.

Fabric 2 or 3.

**467.** 26/B 45 A/G Mich. 6134.

PL. XVI

Bright green with clear blue knob; base fragment; no weathering; material fair.

D. knob 0.005 m. A.T. side 0.004 m.

Pointed base with small knob of added blue glass.

Fabric 4.

**468.** 27/C 61 A/s Mich. 6209.

Colourless with opaque blue knob; knob only; frosted on fracture.

D. knob 0.011 m.

Knob with faint trace of base of vessel adhering.

Fabric 2 or 3.

## E. FRAGMENTS OF UNCERTAIN TYPES, VARYING IN DECORATION

The following fragments, though probably belonging to one or other of the above groups, cannot be attached with certainty to any one of them:

### (a) WHEEL CUTS

**469.** 26/BS 1/J Mich. 6149.

Greenish; fragment of rim and side; no weathering; pin-prick bubbles.

Polished rim bent out slightly from top of side. One broad horizontal wheel cut near rim, another c. 0.03 m. below.

Fabric 3.

**470.** 25/5093 E/D Mich. 6246.

Yellow; fragment of side; no weathering; pin-prick bubbles.

Straight sides tapering downward. Three parallel horizontal wheel cuts close together.

Fabric 5.

### (b) SCRATCHED CIRCLES

**471.** 25/200/A Mich. 6026.

PL. XVI

Greenish colourless; fragment of rim and side; frosted; a few bubbles.

Polished rim bent out slightly from top of side. Frieze of scratched circles round vase near rim.

Fabric 3.

### (c) MOULDED DECORATION

**472.** 27/C 85 A/O Mich. 6216.

PL. XVI

Yellowish green; fragment of rim and side; no weathering; bubbly.

Smoothed rim bent out from top of sides. Blown into a mould. Decoration of a row of vertical hollows near rim, and below that a honeycomb pattern.

Fabric 5.

473. 24/5049 D Mich. 5822.  
 24/4009 E/D Mich. 5735.  
 Two rim fragments as no. 472.

(d) MARVERED-IN FESTOONS<sup>1</sup>

474. 25/236 E/B Mich. 6031. PL. XVI  
 Yellowish with white opaque festoons; fragment of side; no weathering; bubbly, with specks of black impurities in festoons.  
 Sides straight and tapering downward. Festoons of threads trailed on before blowing. After application the threads were combed out into festoons and marvered in, and then the parison was blown to its conical shape.  
 Fabric 3.

475. 25/344/D Mich. 6056. PL. XVI  
 Bluish green with opaque white festoons, and dark blue blobs; fragment of side; no weathering; very bubbly.  
 Shape as no. 474. Festoons as on no. 474; blue blobs added, one at top of each festoon.  
 Fabric 5.

476. 24/137 D/AC Mich. 5369.  
 Greenish with opaque white festoons; fragment of base; frosted; some bubbles.  
 Pointed base, with pontil technique. Festoons, as on no. 474, reaching to base of vase.  
 Fabric 3.

477. 28/C 121 G/C Mich. 6241.  
 Another fragment with similar decoration.

(e) THUMB INDENTS

478. 26/BC 38 A/C Mich. 6146. PL. XVI  
 Bright green; fragment of base; no weathering; some bubbles.  
 Pointed base with pontil technique. Six vertical thumb indents reaching to base, giving vase a roughly hexagonal section.  
 Fabric 4.

<sup>1</sup> This decoration is a copy of the decoration on the dynastic sand-core glasses. Compare also the flasks, IX A i (a) 10, and the toilet-bottles, XIII B.

## CLASS VII

### DRINKING CUPS AND GOBLETS ON STEM

THE vases included in class VII are all drinking vessels. As regards shape and usage they are closely akin to the beakers and goblets of class V, the fundamental difference between the two classes being that, whereas the vases of V had either plain bases, coil bases, or base rings, those of VII have stemmed bases.

The class is divided into two main groups:

- A. Cups—small vessels on a high, slender stem;
- B. Goblets—larger vessels on a thick, dumpy stem.

The cups, A, form a small and very uniform group, and are similar in shape to the modern wine-glass. All except one fragmentary specimen have U-shaped bodies on a slender stem and a spreading base (division i). Some are undecorated; others have single or spiral threads horizontally on the upper part of the body. The one exception (division ii) has a body of 'poppy-head' form, with constricted neck and bulging sides, and is undecorated.

All the known examples, both complete and fragmentary, belong to fabric 4. Those listed come either from c-period houses of 1927 or 1928 or from top-layer houses of 1924 or 1925. Not one was found in a b-period house of 1926. They are, therefore, all fourth century or later, and we must recognize in them the ordinary drinking glasses of that period, because examples of the type were found in houses 209, 293, and C 42, hoarded with other shapes of table ware, also of fabric 4. For this use they probably superseded the beakers of fabrics 2 and 8, class V A.

These cups are found throughout Egypt, but never in great profusion. Edgar lists six examples<sup>1</sup> of the A i type but none of the A ii type, and there are two other examples of type A i in Cairo, both acquired since 1905.<sup>2</sup> Edgar gives, besides, one specimen (no. 32505) of a new type which is of the same general shape but has a folded rim, a cut-out in the body near its junction with the stem, and a pushed-in base. Ranke found a fragmentary example at Karara<sup>3</sup>

<sup>1</sup> A i a, 32500; A i b, 32499, 32501-4.

<sup>2</sup> A i a, J 40445; A i b, J 45775; see App., p. 314.

<sup>3</sup> Ranke, *Koptische Friedhöfe bei Karara*, p. 33. Probably fifth to seventh century.

which he says is like this piece. Other examples of type i may be seen in the Coptic Section of the Kaiser Friedrich Museum,<sup>1</sup> and in the British Museum.<sup>2</sup> Of type ii there is an example in the Askren collection.<sup>3</sup> No complete piece belonging to type iii is known. A fourth type, which is not so far represented at Karanis, may date from a later period than the middle of the fifth century. It has an outsplayed rim above a U-shaped body and the stem and base are as for type i. An example was found at Badari in grave 7910<sup>4</sup> and there is an exact parallel in Philadelphia (case XIII, no. 52).

These types do not appear to have been introduced into the west,<sup>5</sup> but very similar ones are found in Syria. Examples may be seen in Toronto, nos. G 1788, 1797, and 1844, all of typical late Romano-Syrian bluish green glass, the first of which has an applied zigzag of similar glass round the body, while the other two are without decoration. A similar piece is in the de Clercq collection.<sup>6</sup> All have straighter and more outsplayed sides than the Egyptian examples.

The type with a stem formed by the pushed-in technique, iii, is also known in Syria, for example one in the Victoria and Albert Museum from Aleppo (Beck loan, no. 388), of green glass, and one in Oxford (no. 1912.137), bought in Beirut, which has a rounded rim, concave, outsplayed sides, and a spreading stem pushed in up to the base of the bowl.

The first two fragments in group B belong to tall goblets on a knobbed stem and a spreading base. Neither fragment gives evidence for the reconstruction of the upper part of its body. The second of these pieces, no. 491, is plain, and of no particular interest. No parallels to it seem to exist either in Egypt or elsewhere. The first fragment, on the other hand, no. 490, is of exceptional interest from the point of view of its decoration, which consists of raised threads of opaque white and turquoise blue on a colourless body; that is, it belongs to the polychrome 'Schlangenfaden' or 'snake-

<sup>1</sup> Three examples, Wulff, nos. 1196-8, pl. lviii.

<sup>2</sup> One from the Fayûm, bought in 1891.

<sup>3</sup> Mich. 5119; see App., p. 321.

<sup>4</sup> Brunton, *Qau and Badari*, iii, 28, pl. li, 6.

<sup>5</sup> The four forms Kisa F 328-31 are probably all taken (328 undoubtedly is) from Edgar's catalogue. Yet a similar but more conical type does seem to have existed in the west, for it appears on a fresco in the Lateran from Ostia, depicting five persons at a funeral-feast drinking out of such cups, and also on a mosaic from El Djem, now in the Musée Alaoui, Tunis, which shows a cylindrical one-handled wine-bottle with a conical cup on stem standing beside it (*Cat. Mus. Alaoui*, suppl. i (1910), no. 279, p. 23, pl. xv, 6).

<sup>6</sup> De Ridder, no. 390, p. 200.

thread' glass. One other example of this decoration is known from Egypt—a fragment of the body, apparently, of just such a goblet as this Karanis piece, which is said to have come from Old Cairo, and is now in the Arabic Section of the Kaiser Friedrich Museum (no. 2393;<sup>1</sup> Fig. 3, n).

No example of this polychrome snake-thread ware is known from Syrian sites. Polychrome examples in the west, on the other hand, are too well known to need description here: it will suffice to refer to the discussions of the type in Morin-Jean<sup>2</sup> and Kisa.<sup>3</sup> Numerous shapes of vases with this decoration occur, but one of the most typical is that of a high U-shaped goblet on a stem; in other words just the shape to which the Karanis and Old Cairo fragments seem to belong.<sup>4</sup> Unfortunately, the Karanis fragment does not preserve enough of its decoration to indicate whether it was of the same type as that of these western pieces. Even the Old Cairo piece is not complete enough to put its relation to western fabrics beyond doubt. Though its decoration is very like that on some western examples,<sup>5</sup> there are differences observable in the curves and in the general tenor which lead to the suspicion that it did not come from the same workshops as those pieces. And so, while there can be no doubt that the western glasses were made at some western site—almost certainly Cologne—it is probable that there was a centre of fabrication for similar glasses in the east, presumably at Alexandria.<sup>6</sup> Probably also the technique originated in the east rather than in the west, in which case the eastern examples are earlier in date than the

<sup>1</sup> Lamm, *Mittelalt. Gläser*, pl. xxi, 1, and references *ad loc.*:

Colourless with opaque white, yellow, and turquoise blue threads; fragment of bottom of body; no weathering.

L. 0.06 m.

Part of U-shaped body, curving in toward a base ring or a stem at bottom; a trace of an outward bend, i.e., the beginning of the ring or stem, at the bottom makes this position for the fragment certain. Floral design (?). Good ware, fabric 2 (?).

<sup>2</sup> Morin-Jean, pp. 199–216, figs. 271–93.

<sup>3</sup> Kisa, pp. 446–70, figs. 113–30.

<sup>4</sup> For examples see Morin-Jean, form 108, fig. 292; Kisa, p. 448 (type XII), figs. 114 d and 123; Niessen Cat., nos. 120–1, pls. xi, xxv, and xlvi; and Fremersdorf, *Denkmäler*, pl. xxv. Morin-Jean's form 99 is a variant of this form. Another variant, which grew up in the third century, is the so-called *carchesium*, with concave sides, Morin-Jean, form 98, p. 134, and Kisa, pp. 447–8, pl. v, 1. This last developed later into the common Frankish shape with round-pointed base, Kisa, forms E 317–19.

<sup>5</sup> Compare, e.g., the goblet illustrated by Kisa, fig. 123, and Niessen Cat., pls. xxv and xlvi (no. 120), and for the leaf-decoration compare Morin-Jean, fig. 271, 1.

<sup>6</sup> For a fuller discussion of this question see Harden, 'Snake-thread Glasses found in the East,' *Journ. of Rom. Studies*, xxiv, 50 ff.

western. The date of the latter has been fixed to about 200, so that the date of the fabrication of no. 490 must fall within the second century. In house C 62, therefore, it must have been a survival.<sup>1</sup>

The third fragment is equally important, for it is an example of the other type of snake-thread ware, the monochrome. To judge from its curvature it probably belongs to a goblet on stem, but it might belong to a flask (IX) or a goblet with rounded base (V B). No other example of this type of decoration is known from Egypt, but several examples, both complete pieces and fragments, chiefly from flasks, have been found elsewhere in the east, though they are never common.<sup>2</sup> In the west the monochrome snake-thread ware is even commoner than the polychrome, and it had a much longer vogue, lasting down to the fourth century.<sup>3</sup> The fragment under discussion was certainly made in Alexandria because it is of fabric 2; the flasks found in Syria are of greenish glass and are probably of local Syrian make; and so here, too, as in the case of the polychrome variety, eastern fabrics existed, and were probably the precursors of the much more popular western wares.

One important variety of goblet, the two-handled, stemmed chalice, has so far not been found at Karanis, though it is a form that is quite common both in Syria and in the west from the fourth century onward.<sup>4</sup>

#### SKELETON CLASSIFICATION

##### A. Cups

- I. U-shaped body
  - (a) Without decoration
  - (b) With thread decoration
- II. 'Poppy-head' body
- III. Stem fragment of uncertain type

##### B. Goblets

- Three fragmentary goblets of uncertain type

<sup>1</sup> If the piece in the Kaiser Friedrich Museum really came from Old Cairo, it too must have been treasured for a long time before it got broken and was discarded.

<sup>2</sup> For descriptions of the known examples and a full discussion see Harden, *ibid.*

<sup>3</sup> Morin-Jean, pp. 199-216, figs. 271-93 (some only), and Kisa, pp. 446-70, figs. 113-30 (some only).

<sup>4</sup> Compare, from the east, Kaiser Friedrich Museum, Arabic Section, no. 2856, from Rakka (?), bought in Aleppo, which is of dark blue glass, with mould-blown, honeycomb decoration identical with that on Karanis fragments nos. 333 ff. and 472 ff.; and Dalton, *Cat. Early Christ. Antiq. in B.M.*, p. 132 and fig., nos. 657-8; from the west, Morin-Jean, figs. 182 (in Rouen) and 303-4 (in Cologne and Bonn respectively), forms 102-3; Kisa, figs. 155 (from Cologne) and 165 (in the Vatican); and Niessen *Cat.*, nos. 324, pl. xxvi, and 784, pl. xvii, both from Cologne.

## A. CUPS

### I. U-SHAPED BODY

The following complete examples and fragments occurred, with or without thread decoration. There were, besides those listed, numerous other recognizable fragments of the type.

#### (a) WITHOUT DECORATION

**479.** 27/c 53 J/T Mich. 5963.

PLS. VI and XVI

Olive green; one large crack in side; dirty, no weathering; very bubbly with sandy and black impurities; blowing spirals noticeable.

H. varies 0.09-0.093 m. D. 0.072 m. A.T. 0.001 m.

Rounded rim. U-shaped body with slight concavity in sides near rim. Slender, twisted stem, pressed out at bottom with modelling tool to form outsplayed base.

Base concave underneath, and on upper side criss-cross slanting impressions.

Pontil technique. Body not perpendicular to stem.

Fabric 4.

**480.** 27/c 53 J/U Mich. 5964.

Olive green; intact; dirty, no weathering; material as no. 479.

H. varies 0.088-0.092 m. D. 0.07 m. A.T. 0.0008 m.

Shape as no. 479. Cup unstable owing to uneven base.

Fabric 4.

**481.** 28/c 42 J/U Donor.

Light yellowish green; intact; usage stains, no weathering; bubbly with impurities near rim; blowing spirals.

H. 0.091 m. D. 0.068 m. A.T. 0.001 m.

Shape as no. 479, but slanting impressions on base not criss-cross.

Fabric 4.

#### (b) WITH THREAD DECORATION

**482.** 25/209 c/u Mich. 5551.

PLS. VI and XVI

Yellow; intact; no weathering; bubbly.

H. 0.085 m. D. 0.075 m. A.T. 0.001 m.

Shape as no. 479. Horizontal trailed-on thread of similar glass half-way down body.

Body not perpendicular to stem.

Fabric 4.

**483.** 25/293 A/F Mich. 5552.

Yellow; mended, one small fragment missing; no weathering; material fair; a few bubbles.

H. 0.088 m. D. 0.066 m. A.T. 0.001 m.

Shape as no. 479. Trailed-on spiral thread of similar glass on upper half of body.

Fabric 4.

484. 27/C 53 J/V Mich. 5965.

PLS. VI and XVI

Olive green; intact; no weathering; very bubbly, and many impurities, chiefly in thread.

H. varies 0.088-0.093 m. D. varies 0.069-0.075 m. A.T. 0.0008 m.

Shape as no. 479, decoration as no. 483. Bad dent on one side at rim.

Fabric 4.

485. 28/C 42 J/V Mich. 5966.

Light yellowish green; intact; usage stains, no weathering; bubbly, with impurities near rim.

H. 0.091 m. D. 0.068 m. A.T. 0.001 m.

Shape as no 479, decoration as no. 483.

Fabric 4.

486. 27/C 51 H<sup>2</sup>/A Mich. 6186.

Green; stem and half of rim, in many fragments; no weathering; bubbly.

D. 0.083 m. A.T. 0.002 m. A larger cup than usual.

Shape as no. 479, decoration as no. 483.

Fabric 4.

487. 25/220 D/A Mich. 6029.

27/B 108 A<sup>1</sup>/C Mich. 6160.

Two rim fragments of cups as no. 483 ff., green with trailed-on spiral threads of dark brown glass.

Fabric 4.

## II. 'POPPY-HEAD' BODY

Only the following fragmentary specimen occurred:<sup>1</sup>

488. 24/4006/C Mich. 5753.

PL. XVI

Yellow; fragment of rim and fragment of stem and base; no weathering; pin-prick bubbles.

H. 0.073 m. D. 0.047 m. A.T. 0.001 m.

Rounded rim outsplayed from constricted neck. Body bulbous with strongly convex sides. Stem twisted. Outsplayed base, concave below; well-marked slanting impressions on upper side. Pontil technique. No decoration.

Fabric 4.

## III. STEM FRAGMENT OF UNCERTAIN TYPE

489. 27/B 118 M/N Mich. 6165.

PL. XVI

Greenish colourless; fragment of stem and base; no weathering; material good; few bubbles.

D. base 0.05 m. A.T. 0.001 m.

The stem of the vase is a hollow tube from which the base has been widened into a bulb by blowing. This bulb was then pushed in to a point at the base of the stem until the opposite sides of the bulb were contiguous, except at the edge, where a tubular ring was left.<sup>2</sup>

Fabric 2 or 3.

<sup>1</sup> There is a complete example of the type in the Askren collection, Mich. 5119; see App., p. 321.

<sup>2</sup> For this type of base compare the curious bottle-flask, Fig. 4, e, from Karanis (Cairo J 45767; see App., p. 315).

### B. GOBLETS

The three following fragmentary specimens, different one from the other, belong to stemmed goblets whose complete type is uncertain:

**490.** 28/c 62 n/s Cairo J 54775.

PL. XVI

Colourless with opaque white and turquoise blue threads; bottom of body, stem, and part of base in one fragment; no weathering; material fair.

D. base 0.044 m. H. of fragment 0.04 m. A.T. 0.0025 m.

U-shaped body ending in a twisted stem. Stem contracted at top and bottom, giving it the form of a torus moulding. Base outsplayed and flat, and formed, as before, by pressing out with a modelling tool. On the body and base remains of trailed-on threads in opaque white and turquoise blue. On the upper side of base, a circular trailed-on thread of opaque (?) white.

Fabric 2.

**491.** 24/5020 c/b Mich. 5806.

PL. XVI

Pale green; bottom of body, stem, and part of base in one fragment; spots of milky weathering; material good; few bubbles.

D. base 0.05 m. A.T. 0.0025 m.

Sides of body convex with sharp inward curve at bottom to meet stem. Short, twisted stem, showing its technique very clearly. Outsplayed base, pressed out with a modelling tool, which has left slanting impressions on upper side. Under side concave. Pontil technique.

Fabric 4.

**492.** 26/b 43 e/b Mich. 6133.

PL. XVI

Colourless with slight greenish tinge; fragment of side; no weathering; background good with few bubbles; barbotine bubbly.

H. of fragment 0.035 m. A.T. 0.001 m.

Fragment of curved side of tall goblet. Snake-thread pattern in barbotine technique, of similar glass, the extant part consisting of a 'snake-head' with impressed markings, and part of a coil.

Fabric 2.

## CLASS VIII

### JARS

TO class VIII belong those vessels which stand midway between bowls and beakers on the one hand, and flasks on the other. Their mouth is narrower in proportion to the greatest diameter of the vessel than is the case with bowls and beakers, while their necks are shorter than those of the flasks.

The class is numerically small, but may be divided into four main groups:

- A. Vases with deeply concave neck and openwork zigzag coil from rim to shoulder: bulbous body;
- B. Vases as A, but without a zigzag coil;
- C. 'Poppy-head' type with short constricted neck and bulbous body;
- D. Small jars with ovoid or drop-shaped bodies.

The first three groups contain large vases only, whose chief, if not sole, use must have been for the table;<sup>1</sup> some, perhaps, being employed as drinking vessels, but the majority more likely as containers.<sup>2</sup> The fourth group comprises small vases only, which were probably used to contain toilet preparations.<sup>3</sup>

The jars of group A only differ among themselves in that some have a pad base and some a plain concave one, some thumb-indented sides and some plain sides. They are uniform in their fabric, which is invariably fabric 4 of either yellow or green shades. Of the examples listed, two come from the hoard found in 209 C, two from the hoard in 293 A, one from the hoard in BC 61 D, and one from the hoard in C 42 J. All therefore come from fourth- and fifth-century houses, and the type is late.

Nine examples are listed by Edgar.<sup>4</sup> One, no. 32517, has a plain concave base and thumb indents on the body, while eight are of the pad-base variety with or without thumb indents. Other Egyptian

<sup>1</sup> Examples were found in hoards with other types of table ware in houses 209, 293, C 42, and BC 61.

<sup>2</sup> In particular the examples in groups A and B have too broad and too horizontal a lip to make it possible to drink out of them.

<sup>3</sup> Another possible use is as inkwells.

<sup>4</sup> Edgar, *Cat.*, nos. 32509-17. No. 32516 is specially noteworthy, being of blue glass with a green zigzag coil.

examples may be seen in Cairo (J 46483; see App., p. 314); in the Askren collection (Mich. 5121-5; see App., p. 321); in Toronto (G 1821); in the Kaiser Friedrich Museum, Coptic Section;<sup>1</sup> and in the British Museum (Franks bequest, 1893, from the Fayûm).

A very similar type to these zigzag jars, but with a smaller and lighter zigzag border in comparison to the height of the vessel, is frequent among collections of Romano-Syrian glass,<sup>2</sup> but the type does not seem to have spread to the west. Another common Romano-Syrian type of jar, probably later in date, is akin in shape, but has two or more vertical handles from the rim to the shoulder instead of a zigzag coil.<sup>3</sup> The openwork zigzag is also found on an octagonal jar in the Kaiser Friedrich Museum, Coptic Section,<sup>4</sup> and on a pentagonal vessel with mould-blown decoration, formerly in the Sambon collection in Paris.<sup>5</sup>

The jars of group B are similar in general shape to those of group A, but differ from them in that they lack the openwork zigzag coil from rim to shoulder which is such a marked characteristic of the A group. They are all fragmentary, but two of them are sufficiently preserved to make the restoration of their shape certain. Some have a concave base, others stand on a base ring or on pinched toes. Some are undecorated, others have corrugations on the body, or added coils. They all belong to one or other of fabrics 3, 4, or 5, and have been found in late layers only; they must date from the fourth and fifth centuries.

Important parallels to type B i occurred in the Karanis hoard published by Wainwright.<sup>6</sup> No. J 47094 c in that hoard is identical with no. 499, J 47105 e is like no. 502 with the addition of S-shaped corrugations on the body, J 47105 f is again similar, but has thumb indents in addition to S-shaped corrugations, J 47092 f has not only these two kinds of decoration but also a third—a trailed-on spiral thread on the neck—and J 47097 e is plain save

<sup>1</sup> Wulff, no. 1200, pl. lviii.

<sup>2</sup> See, e.g., Niessen Cat., nos. 1077-8, pls. xii, lii, and liii; Kisa, figs. 97 f. and 108, pp. 340 and 434-6; and de Ridder, no. 557, &c., p. 252, pl. xxix. These Syrian examples (Kisa, forms F 376-7) have no base ring. An example in Mayence, which comes from Asia Minor, is more like the Egyptian type than the Syrian, for it has both a pad base and a heavy zigzag (no. o. 6601, dark green glass).

<sup>3</sup> For examples see de Ridder, nos. 551 ff., p. 250, pl. xxix; Niessen Cat., nos. 1075 and 1076 a-c, pls. xlv and lii; and numerous examples in museums, e.g., Oxford no. 1910.786, from Hebron.

<sup>4</sup> Wulff, no. 1199, pl. lviii, from Gizeh.

<sup>5</sup> Kisa, p. 804, fig. 330.

<sup>6</sup> Wainwright, type 5, pp. 78-9, pl. xxxvii.

for an added coil beneath the rim. Of type B ii no examples from elsewhere can be quoted, but division iii is represented by two pieces. One is in the British Museum,<sup>1</sup> and is brownish yellow, belonging to fabric 4 (Fig. 3, k); the other is green, belonging to fabric 5 and is in the Victoria and Albert Museum.<sup>2</sup>

But besides these normal examples there are in Wainwright's hoard<sup>3</sup> two very interesting jars which can only be interpreted as unfinished specimens of this group. One, J 47098 e, is a jar of yellow glass standing on a base coil. It has a bulbous body and a concave neck strengthened by a horizontal coil of similar glass. The rim is unworked, and there is no pontil mark. The vase is therefore exactly like no. 499 except that it has a base coil and that the rim has not been folded over. The other (J 47095 c) is still more embryonic, being a plain bulb of dark green glass with narrowed neck, slightly concave base, and unworked rim. It, too, has no pontil mark.<sup>4</sup>

Outside Egypt this group is equally rare. Of the variety with concave base there are two important examples with scratched decoration. One in the British Museum comes from Syria (bought in 1891), but both its fabric (olive green, fabric 5) and its decoration (a frieze of grape-clusters) seem thoroughly Egyptian, and it may have been manufactured in Egypt. The other is in the Niessen collection, and was found at Andernach.<sup>5</sup> It bears geometrical decoration. Of the variety with pinched toes there is an example in the British Museum,<sup>6</sup> of green glass, from Syria (Fig. 3, e).

The jars of group C are uniform in shape of neck and body. They

<sup>1</sup> From the Fayûm, bought in 1891 from the Wallis collection:

Yellow, with greenish yellow coil; intact; no weathering.

H. 0.084 m. D. 0.103 m.

Rim sharply outsplayed and rounded; neck deeply concave: body ovoid with greatest diameter at shoulder; three large toes pinched out from bottom of body, which is convex. On neck, a horizontal coil.

Fabric 4.

<sup>2</sup> No. 344. 1900, from Egypt, formerly in the Myers collection:

Green; intact; no weathering.

H. 0.095 m. D. 0.086 m.

Rim sharply outsplayed and folded upward and inward; neck and body as on the British Museum example, but no coil on neck.

Fabric 5.

<sup>3</sup> Wainwright, type 6, p. 80, pl. xxxvii.

<sup>4</sup> This absence of pontil mark on these two specimens with unworked rim is technically instructive; see p. 17 f. above.

<sup>5</sup> Niessen Cat., no. 325, pl. xxvi.

<sup>6</sup> Formerly in the Durighello collection, presented in 1913.

differ in that some have a pad base and some a stemmed base, and that some have two small coil handles with side-whisker tails, and some are handleless. In fabric and date they are parallel to group A, and three of the four listed were found in hoards which also contained group-A pieces. They were probably drinking vessels and superseded, as such, the beakers and goblets of class V.

This type is not so common as A, though it is contemporary with it. Three examples are listed by Edgar<sup>1</sup> and there are three other examples in Cairo found after Edgar's catalogue was published, all from Karanis.<sup>2</sup> Others may be seen in the British Museum,<sup>3</sup> in the Victoria and Albert Museum,<sup>4</sup> and in Toronto.<sup>5</sup> There is also in Toronto a curious specimen of the c i a type which has two independent decorations, one over the other. At the greatest diameter there is a scroll ornament scratched round the body, over which is a painted design of horizontal lines and vertical dashes (Fig. 3, f).<sup>6</sup> Two other types of jar of this general shape are published by Edgar. One, no. 32748, has a concave base, a bulbous body, an everted rim, and a lid, and is like Morin-Jean's form I, which was used commonly as a cinerary urn in the west. No provenance is attached to this example in Cairo, and, as it is of bluish green glass, it may well come from Syria or even farther afield. The other, no. 32784, has a base ring, an ovoid body, and an everted rim, and comes from Mit Rahineh. It may be of early Arab date as it came to the Museum along with others, for instance nos. 32788-93, which are certainly of that period.<sup>7</sup> Finally, there is a jar from Harageh in Brussels (no. E 5667) which is of this same general type but has a more elongated body and stands on a short stem. It is of yellowish glass with a blue spiral thread at the rim.

Nothing quite parallel to these jars seems to occur in other provinces. The nearest approach to them are perhaps handleless ollae on a base ring, such as Kisa's snake-thread type no. VIII<sup>8</sup> and other

<sup>1</sup> No. 32506, c i a; 32507, c i a, but of purple glass with green handles, and having a folded rim; and 32508, c i b.

<sup>2</sup> Nos. J 45770 and 46485, c i b; and J 45773, c ii; see App., p. 314.

<sup>3</sup> One yellow, type c i b (Fayûm, 1891); the other also yellow, but type c ii, from the Fayûm.

<sup>4</sup> Beck loan, no. 621, yellow, c i b.

<sup>5</sup> G 1969, yellowish green, c i b.

<sup>6</sup> G 1980, yellowish green. It is possible that this vase is unfinished, and that the painted decoration was only sketched out for the guidance of the glass-cutter.

<sup>7</sup> It is, however, very similar in shape to Roman vases of western fabric, e.g., Niessen Cat., nos. 186 ff. and 970 ff.

<sup>8</sup> Kisa, p. 447, fig. 128 a; Niessen Cat., no. 132, pl. xxiv.

similar types like those of the Niessen collection nos. 186-9 and 970-4.<sup>1</sup> Here also should be mentioned the jars used as cinerary urns in the west during the first and second centuries.<sup>2</sup> Some have two handles, others are handleless; some stand on a base ring, others have a flattened or concave base: but all have an everted rim and a bulbous body and are essentially of this type. A similar shape is exceedingly common in pottery during the Roman period, not only in glazed fabrics, but also in coarse ware.

The small jars of group D all have a folded rim, a constricted neck, and a drop-shaped body with sides tapering downward. Not one has any decoration. Three are of colourless glass and belong to fabric 2, and the fourth is dark green, belonging to fabric 5. All were found in houses of the late third or the early fourth century. The type is a simple and obvious one, and may well have had a long life. In shape it is nearly akin to some of the small flasks of class IX B, and no hard-and-fast line can be drawn between examples of the two types.

Numerous examples are listed by Edgar,<sup>3</sup> some colourless and others green. There are also three examples in Toronto (nos. G 1848, 3885, and 3888, all from Luxor), one in Boston from Gizeh (no. 11. 1121), and other specimens are published by Woolley and MacIver from the Karanòg cemetery,<sup>4</sup> by Quibell from Saqqara,<sup>5</sup> and by Petrie from Hawara.<sup>6</sup> And, doubtless, examples are frequent in other collections. A slightly larger vase, yellowish green, fabric 4, of this general shape is in the Egyptian Department of the British Museum.<sup>7</sup>

Similar small jars are found all over the Empire, but the type is

<sup>1</sup> *Niessen Cat.*, pls. xxvii, xlvi, xlvi, and 1.

<sup>2</sup> These cinerary urns are extremely rare in the east, though occasional examples occur like the Cairo vase mentioned above which probably comes from Syria, as it is of bluish green glass. Kisa (p. 312) because of the colour of the glass, and Morin-Jean (p. 44) because of the shape of the lids which he maintains is like that of the lids of Greek vases, both affirm that, despite the lack of finds on eastern sites, many of these urns were manufactured in the east: but neither of these reasons is adequate to justify such a conclusion, and until some more satisfactory evidence is brought to light, the vast majority of these urns must be considered to be of western fabric as well as provenance. For the types see Morin-Jean, forms 1-5, pp. 42 ff., and Kisa, forms c 167-8 and 170-2, pp. 311 ff.

<sup>3</sup> Edgar, *Cat.*, nos. 32522, 32526-8, 32532-9.

<sup>4</sup> Woolley and MacIver, *Karanòg*, pl. xxxix, no. 7351, G 356, of green glass.

<sup>5</sup> Quibell, *Saqqara*, i, 30, pl. xxxiv.

<sup>6</sup> Petrie, *Hawara*, pl. xix, 3, and pl. xx, 5.

<sup>7</sup> It was found at Akhmim in a wooden box divided into four compartments, each of which contained a glass vase. The other three vases are small one-handled bottles; see p. 238 below. The group is no. 20774 in the museum.

too amorphous to find a place in either Morin-Jean's or Kisa's lists. A published example is no. 976 in the Niessen collection, from Cologne.<sup>1</sup>

#### SKELETON CLASSIFICATION

- A. Deeply concave neck with openwork zigzag coil; bulbous body
  - I. Concave base
  - II. Pad base
    - 1. Plain bulbous body
    - 2. Thumb-indented body
- B. As A, but without an openwork zigzag coil
  - I. Concave base
  - II. Base ring
  - III. Pinched toes
- C. 'Poppy-head' type with small constricted neck; bulbous body
  - I. Pad base
    - (a) Rounded rim, without handles
    - (b) Rounded rim, with two coil handles
  - II. Stemmed base
- D. Small jars with ovoid or drop-shaped bodies

#### A. DEEPLY CONCAVE NECK WITH OPENWORK ZIGZAG COIL; BULBOUS BODY

##### I. CONCAVE BASE

Type with folded rim, inward. Only one complete example occurred. Probably fragments were also found, but they are indistinguishable from those of division ii below.

493. 25/293 A/C Mich. 5555.

PLS. VI and XVII

Light green; small fragment missing from rim; no weathering; bubbly with few impurities.

H. 0.101 m. D. 0.077 m. A.T. 0.001 m.

Rim outsplayed horizontally and folded upward and inward. Neck concave, shoulder sloping. Body bulbous with greatest diameter near shoulder. Base concave with pointed kick. Pontil technique. Round the middle of the neck a coil of similar glass, and joining rim with shoulder an openwork zigzag coil of the same.

Fabric 4.

<sup>1</sup> Niessen Cat., pl. xlvi.

II. *PAD BASE*

Type with folded rim, inward. The following complete examples occurred, with or without thumb indents on body. Fragments of rims and zigzag neck coils were also found, and probably other fragments of the type too, but these are indistinguishable from fragments of bowls or flasks.

1. *Plain bulbous body*

494. 25/293 A/B Mich. 5554.

PLS. VI and XVII

Pale yellow with streaky greenish blue and yellow coil; intact; no weathering; bubbly and full of brown sandy impurities.

H. 0.098 m. D. 0.087 m. A.T. 0.001 m.

Rim, neck, and body as no. 493. Pad base well outsplayed and almost flat below.

Well-marked slanting impressions on upper side. Slight kick below. Pontil technique.<sup>1</sup> Openwork zigzag coil from rim to shoulder.

Fabric 4.

495. 28/C 42 J/W Mich. 5934.

Olive green; intact; usage stains and scratches, no weathering; material fair; some bubbles.

H. varies 0.108-0.118 m. D. 0.107 m. A.T. 0.0015 m.

Shape as no. 494, but slanting impressions very faint. Openwork zigzag coil of similar glass.

Fabric 4.

496. 27/209 C/HI Donor.

Greenish yellow; intact; no weathering; bubbly, with traces of stone.

H. 0.13 m. D. 0.108 m. A.T. 0.001 m.

Shape as no. 494, but base ring not quite so flat. On neck four or five revolutions of spiral thread and an openwork zigzag coil from rim to shoulder, both of similar glass.

Fabric 4.

2. *Thumb-indented body*

497. 26/BC 61 D/F Mich. 5553.

Dark brown with yellowish green coil; hole in body; no weathering; material good; few bubbles and impurities, except in coil.

H. 0.128 m. D. 0.107 m. A.T. 0.002 m.

Shape as no. 494. Well-marked slanting impressions on base ring. Openwork zigzag coil of yellowish green glass. Nine large, vertical thumb indents round body.

Fabric 4.

498. 27/209 C/JI Mich. 5935.

PLS. VI and XVII

Yellow; rim chipped; dirty, no weathering; bubbly; few impurities.

H. 0.13 m. D. 0.113 m. A.T. 0.001 m.

Shape as no. 494. Zigzag coil of similar glass. Five large, vertical thumb indents round body.

Fabric 4.

<sup>1</sup> The pontil wad, traces of which remain, is bluish, and was obviously taken from the same pot as the coil. There are traces of iron on the wad.

## B. AS A, BUT WITHOUT AN OPENWORK ZIGZAG COIL

## I. CONCAVE BASE

The following fragmentary examples were listed. Smaller fragments also occurred. All belong to the same general type, but they differ in minor details of shape and decoration.

499. 24/158 A/H Mich. 5861.

PL. XVII

Greenish colourless with green coil; rim and neck complete, and numerous fragments of body and base; no weathering; bubbly.

H. 0.145 m. G.D. 0.145 m. A.T. 0.001 m.

Rim well outspayed and folded upward and inward. Neck short and deeply concave. Curved junction of neck and shoulder. Body bulbous. Base concave without pontil technique. Thick coil of green glass round middle of neck.

Fabric 3.

500. 24/4029 G<sup>1</sup>/F.

Greenish colourless; rim and neck complete and numerous fragments of body and base; dirty, no weathering; material fair; some pin-prick bubbles.

D. rim 0.105 m. A.T. 0.001 m.

Shape as no. 499. Thick coil round middle of neck and a quadruple spiral thread leading from it to rim, both of similar glass.

Fabric 3.

501. 27/B 118 E/H Mich. 6163.

A fragment of rim and neck as no. 499, green. Fabric 8.

502. 27/C 57 A/K Mich. 6202.

PL. XVII

Green; fragments of rim, neck, and shoulder; no weathering; bubbly.

D. rim 0.098 m. A.T. 0.0018 m.

Broad funnel rim, folded upward and inward. Neck short and deeply concave. Shoulder sloping. Body bulbous. Series of S-shaped corrugations on body, vertically. Coil of similar glass underneath rim.

Fabric 5.

503. 24/100/0 Mich. 5363.

PL. XVII

Dark blue; rim, neck, and some fragments of body; no weathering; bubbly.

D. rim 0.075 m. A.T. 0.001 m.

Rim well outspayed at angle of 45° and folded upward and inward. Neck short and deeply concave. Sloping shoulder. Bulbous body. Vertical corrugations on body.

Fabric 7.

504. 24/113 C/E Mich. 5859.

Fragment of rim as no. 503, lighter blue glass. Fabric 7.

## II. BASE RING

Two fragmentary examples occurred. No smaller fragments were recognizable.

505. 27/C 56 G/AI.

Pale green; in many fragments, incomplete; contents stain, no weathering; bubbly.

H. c. 0.10 m. G.D. c. 0.075 m. A.T. 0.0013 m.

Broad funnel rim, folded upward and inward. Short, deeply concave neck. Sloping shoulder. Ovoid body with greatest diameter at shoulder. Small pad base, well outsplayed, and without slanting impressions on ring. Base slightly concave with flat-edged reamer mark. No pontil technique. Spiral thread of similar glass from rim to base of neck.

Fabric 3.

506. 24/148 E/L Mich. 5862.

Green; lower part of neck, body, and base in many fragments; no weathering; very bubbly.

From a large flask. A.T. 0.0015 m.

Short, deeply concave neck. Sloping shoulder. Bulbous body. Pad base with faint slanting impressions on ring. Base concave, without pontil technique.

Fabric 5.

### III. PINCHED TOES

One fragmentary base with three pinched toes was found, which, on the analogy of complete specimens found elsewhere,<sup>1</sup> must certainly belong to this group.

507. 28/C 84 A/G Mich. 6237.

PL. XVII

Yellow; base only; no weathering; pin-prick bubbles.

W. across toes 0.07 m. L. of toes 0.025 m.

Base of bulbous jar with three long toes pinched out from bottom of body. Pontil technique in centre of base below.

Fabric 4.

## C. 'POPPY-HEAD' TYPE WITH SMALL CONSTRICTED NECK; BULBOUS BODY

### I. PAD BASE

The following specimens, with or without handles, occurred. Recognizable fragments of the type were rare.

#### (a) ROUNDED RIM, WITHOUT HANDLES

508. 25/293 A/D Mich. 5556.

PLS. VI and XVII

Yellow; intact; no weathering; bubbly, with impurities; blowing spirals.

H. 0.095 m. D. body 0.095 m. A.T. 0.0015 m.

Small rounded rim outsplayed at angle of 45° from neck constriction. Wide bulbous body with sides sloping steeply downward from neck to greatest diameter half-way down. Below greatest diameter the sides slope in again sharply toward base. Pad base, well outsplayed and almost flat below. Faint slanting impressions on upper side. Pontil technique. Thick zigzag coil of similar glass round body at greatest diameter, well fused in.

Fabric 4.

<sup>1</sup> Compare the examples in the British Museum and in the Victoria and Albert Museum, p. 176 above.

## (b) ROUNDED RIM, WITH TWO COIL HANDLES

509. 27/209 C/FI Mich. 5949.

PLS. VI and XVII

Greenish yellow; radiate crack in the side and another small crack besides; no weathering; bubbly, and full of black impurities; blowing spirals very noticeable.  
H. 0.105 m. D. body 0.099 m. A.T. 0.001 m.

Shape as no. 508, but sides of body more gently curved and slight kick in base.  
Zigzag coil of similar glass round lower part of body; over this, at neck, two circular coil handles with side-whisker tails pinched to a wavy contour and reaching to base ring.

Fabric 4.

510. 26/B 75 A/N Mich. 6145.

Yellowish colourless with purple streaks; fragment of neck and body; no weathering; bubbly.

D. rim 0.08 m. A.T. 0.001 m.

Shape as no. 508, with zigzag coil on body, but with spiral thread round neck besides.

Fabric 4.

## II. STEMMED BASE

There are two small coil handles at neck. Only the following complete example occurred. Fragments would usually be indistinguishable from those of division I above.

511. 28/C 42 J/X Mich. 5950.

PLS. VI and XVII

Yellow; intact; contents stain and patches of iridescence and milky weathering; material fair; few bubbles and some black impurities.

H. 0.101 m. D. body 0.093 m. A.T. 0.002 m.

Rim, neck, and body as no. 508. Twisted stem, short and thick, and pressed out to broad base at bottom with modelling tool. Concave base, with well-marked slanting impressions on upper side. Pontil technique. Several revolutions of thin spiral thread at greatest diameter of body and over this two coil handles at neck with side-whisker tails pinched to a wavy contour and reaching to just below greatest diameter.

Fabric 4.

## D. SMALL JARS WITH OVOID OR DROP-SHAPED BODIES

All are uniform in type and have no decoration. The following examples were listed. Smaller fragments of the type were rare.<sup>1</sup>

512. 24/5007 F/C Mich. 5560.

PLS. VI and XVII

Colourless with slight greenish tinge; intact; traces of milky weathering; bubbly, with some impurities.

H. 0.039 m. D. 0.03 m. A.T. 0.0015 m.

Rim outsplayed from concave neck and folded upward and inward. Ovoid body

<sup>1</sup> They would, however, be indistinguishable from fragments of small flasks unless part of the neck and rim was preserved.

with greatest diameter at shoulder and sides tapering in from there to base. Base thick and solid. Pontil technique.<sup>1</sup>

Late fabric 2.

Found in a cylindrical wooden box with no lid. Bottom half of box painted red, upper half black or dark brown (PL. VI).

**513.** 24/5021 B/H Mich. 5559.

Colourless with slight greenish tinge; intact; strain-cracked, no weathering; material good.

H. 0.04 m. D. 0.025 m. A.T. 0.001 m.

Shape as no. 512, but body irregular and uneven.

Fabric 2.

**514.** 28/C 122 D<sup>1</sup>/A Mich. 5968.

PLS. VI and XVII

Dark green; small chip out of rim; traces of milky weathering; bubbly and full of impurities.

H. 0.035 m. D. 0.03 m. A.T. 0.0013 m.

Shape as no. 512. Rim not evenly folded all round.

Fabric 5.

**515.** 28/B 119 C/J.

Fragment of body and base of a jar like no. 512 ff., but with a more cylindrical body.

Fabric 2.

<sup>1</sup> The wad shows traces of iron.

## CLASS IX FLASKS

ALL vases with tall, narrow necks and bulbous bodies but without handles are included in class IX. They are to be distinguished from the jars of the preceding class by the height of their necks, and from the bottles of class X by the width of their bodies.

In size these flasks vary greatly. Some examples are less than three centimetres high,<sup>1</sup> others are over twenty-five centimetres,<sup>2</sup> and many intermediate sizes occur within these limits. Roughly, however, they may be divided into two main groups, one of large vases of an average height of about twenty centimetres, and one of small vases of an average height of about six centimetres; and in fabric these groups are also distinct. The large vases all belong to fabric 3, 4, or 5, while the small vases belong almost entirely to fabric 1, 2, or 8.<sup>3</sup> In all probability this difference in size and fabric corresponds to a difference in usage. The large flasks must have been mainly, if not entirely, employed as table ware, for holding wine and other liquids.<sup>4</sup> The small ones are too tiny, on the whole, to have been used for anything except toilet preparations.

Yet morphologically these two groups are not distinct. The same shapes and techniques occur in both and it has, therefore, not been deemed advisable to separate them on the basis of size in the Catalogue. All have narrow necks with more or less outsplayed rims and bulbous bodies with contours varying from inverted-piriform to globular. They have been divided into two main groups:

- A. Tall-necked flasks with constriction at the base of the neck;
- B. Tall-necked flasks without constriction at the base of the neck.

The only difference between the groups is this presence or absence of a constriction:<sup>5</sup> in both the neck is comparatively tall, and is generally cylindrical for at least part of its height. Within the two groups subdivisions are made on the same principles as were employed in the previous classes; first, base technique, second, rim technique, and third, decoration.

<sup>1</sup> E.g., no. 521.

<sup>2</sup> E.g., no. 593.

<sup>3</sup> Only a few examples belong to fabric 3 or 5.

<sup>4</sup> Some of them were found in hoards (e.g., in BC 61 D, C 42 F, and 209 C) with bowls and cups which were certainly table ware.

<sup>5</sup> This constriction is not usually a cut-in made during blowing, but is made afterwards with a modelling tool, the mark of which can be seen.

A group of fragments, c, is appended which contains examples of interesting types of base belonging to flasks the shape of whose body and neck is unknown owing to the absence of complete specimens.

Almost all the flasks in group A have plain, usually more or less concave, bases. Only one example is known with a base ring and only one with a base coil.<sup>1</sup> Four types of rim occurred, three different types of folded rim and a rounded rim. Many of the vases are entirely undecorated, but others have simple decoration of various sorts, including thumb indents, added coils and threads, pinches, raised ribs, corrugations, and wheel cuts or wheel incisions.<sup>2</sup>

The group includes examples of every fabric except number 9. The large vases, as noted above, can all be attributed to fabric 3, 4, or 5, and are probably late in date, that is, not before c. 300. That this is true is borne out by the fact that they came mostly from top-layer houses or from C- and B-period houses of 1927 or 1928, while none of them was found in the B-period houses of 1926. The smaller vases, on the other hand, belong mostly either to fabric 1 or 2, or to fabric 8, and they are found commonly in the B-period houses of 1926, as well as in later houses. It is certain that they were being made at least as early as the second century.<sup>3</sup> But since a few of these small vases belong to one or other of fabrics 3-7,<sup>4</sup> it seems that after the introduction of these wares, when the type as a whole had been adapted in larger sizes for the usage of the table, it continued to be made in smaller sizes for toilet vases.

Specimens from Egypt belonging to this type are very numerous in other collections. For the most part they conform exactly to one or other of the variants catalogued below, and need no detailed

<sup>1</sup> If fragments of others of these two types occurred, they were insufficiently preserved to be recognizable.

<sup>2</sup> Shoulder collars, raised pinches, and corrugations are found only on large vases; thumb indents, wheel cuts and incisions, and trailed-on threads, whether in relief or marvered in, are found only on small vases; and coils and raised ribs are found on both large and small vases.

<sup>3</sup> In origin this type goes back earlier still, for there are many small flasks made of millefiori and other fine fabrics which are found throughout the Empire in first-century levels and which are of this type, but with a less pronounced and less everted rim. It is to this early group that the Nubian flasks published by Woolley and MacIver, *Karanog*, no. 7340, pl. xxxvii, and by Reisner, *Excav. at Kerma, Harvard African Studies*, ii, 47, fig. 20 belong, and also, e.g., the flask illustrated in colour by Kisa, pl. II, 8, opp. p. 404 (from Cologne). These earliest examples are closely akin in shape to the millefiori toilet-bottles of type XIII B, and it is often difficult to draw a dividing line between the two classes.

<sup>4</sup> E.g., nos. 519, 557, and 583-5.

description,<sup>1</sup> but a few vases occur which show variations in technique or decoration or both. Of the group with plain base and rim

<sup>1</sup> The following is a list of those noted:

A i (a) 1. Small examples:

Edgar, *Cat.*, nos. 32593, 32597, 32600-4, 32608 (blue), 32610-11, 32700.  
 Wainwright, nos. J 47095 b, 47100 b, type I G, p. 75.  
 Cairo, J 47116 b; Wainwright, *Annales*, xxv, 102-4.  
 Askren collection, Mich. 5141-4, 5238-41, 5243-5, 5247; see App., p. 322.  
 Victoria and Albert Museum, 1917. 1897 (from Oxyrhynchus, E.E.F.).  
 Boston, 02. 824 (from the Fayûm), 04. 1933 (from Akhmim), 07. 539 (from Deir-el-Bahari).  
 The Oriental Institute, the University of Chicago, one example.  
 Musée Guimet, two examples.  
 Petrie collection, University College, London, one example, opaque yellow glass.  
 Quibell, *Saqqara*, i, 30, pl. xxxiv, one example.  
 Petrie, *Hawara*, pls. xix, 6 (= *id.*, *Daily Use*, pl. liv, 535), and xx, 4 and 15 (= *id.*, *Daily Use*, pl. lv, 575).  
*Id.*, *Illahun*, pl. xxxiii, 4 (from Gurob, now in the British Museum).  
*Id.*, *Tombs of Courtiers*, p. 18, pl. xlvi.  
*Id.*, *Roman Portraits*, p. 20, pl. xiv (now in Edinburgh, 1911. 210. 4 c, d).  
*Id.*, *Hyksos*, pl. xxxvii B.  
 Woolley and MacIver, *Areika*, p. 31, pl. xxii, nos. 5052, 5059, 5072.  
*Id.*, *Karanôg*, nos. 7341 (G 181) and 7344 (G 518).  
*Liv. Ann.*, xi, 153, pl. xxxi, type III j (from Faras).

Large examples:

Wainwright, nos. J 47095 a, 47098 a, 47099 a, type I A.

A i (a) 2. Small examples:

Askren collection, Mich. 5231; see App., p. 322.  
 Quibell, *Saqqara*, i, 30, pl. xxxiv, one example.  
 Petrie, *Hawara*, pl. xix, 4 (= *id.*, *Daily Use*, pl. liv, 537), and pl. xx, 14 and 18 dark blue glass (= *id.*, *Daily Use*, pl. lv, 573 and 578).  
*Id.*, *Roman Portraits*, p. 20, pl. xiv (now in Edinburgh, 1911. 210. 4 l).  
 Woolley and MacIver, *Karanôg*, no. 7356 (G 263).

A i (a) 3. Large examples:

Edgar, *Cat.*, nos. 32558-9, 32561-3, and 32782 (this last from Karanis).  
 Askren collection, Mich. 5127-9, 5133-5; see App., p. 322.  
 Metropolitan Museum, Egyptian Department, 30-3.  
 British Museum, Franks bequest, 1893 (from the Fayûm), and E.E.F., 1902 (from Oxyrhynchus).  
 Cairo, J 43805 and 45778 (see App., p. 314); Cairo, J 47263; Wainwright, *Annales*, xxiv, 116.

A i (a) 4. Small examples:

Edgar, *Cat.*, no. 32560.  
 Askren collection, Mich. 5130-1; see App., p. 322.

A i (a) 5. Large examples:

Petrie, *Illahun*, pl. xxxiii, 1 (from Gurob, now in the British Museum).  
 Cairo, J 39621; see App., p. 314.  
 Wainwright, nos. J 47098 b, 47099 b, c, 47101 a, type I A, pp. 70-1.

A i (a) 6. None.

*Note continued on next page.*

folded inward, i (a), there is one in Edgar (no. 32564, small) which combines types 3 and 5, while Mich. 5132 in the Askren collection (see App., p. 322) combines types 4 and 5, and one in the Kaiser Friedrich Museum, Coptic Section, has a shoulder collar like type 3, but also has vertical corrugations on the body.<sup>1</sup> In Wainwright's hoard from Karanis there are several variants. Nos. J 47094 b, 47100 a, and 47105 a (type 1 B) are of type 3, but with a plain coil instead of a collar; nos. J 47094 a and 47098 d (type 1 B) are of the same type, with coil, and have a coil beneath the rim also; and no. J 47101 d (type 1 F) has a rim coil like type 5 but has vertical corrugations on the body besides. At Karanòg a small vase was found<sup>2</sup> with a body

*Note continued from previous page.*

A i (a) 7. None.

A i (a) 8. Small examples :

Edgar, *Cat.*, nos. 32574-5.

The Oriental Institute, the University of Chicago, one example.

Oxford, 1932. 1130 (from el-Amarna).

Musée Guimet, one example.

A i (a) 9. Small example :

Petrie collection, University College, London (from Hawara), greenish with dark blue threads.

A i (a) 10. Small example :

Petrie collection, University College, London, green with yellow combed threads.

A i (b). None.

A i (c) 1. Small examples :

Edgar, *Cat.*, nos. 32596, 32599.

Wainwright, no. J 47101 c, type 1 E, p. 74.

Cairo, J 47116 c; Wainwright, *Annales*, xxv, 102-4.

A i (c) 2. None.

A i (c) 3. Small examples :

Askren collection, Mich. 5137-40; see App., p. 322.

Cairo, J 46576; see App., p. 314.

Woolley and MacIver, *Areika*, p. 31, pl. xxii, no. 5053.

*Idd.*, *Karanòg*, nos. 7345 (G 361) and 7346 (G 198).

Brussels, E 2554 (from *Oxyrhynchus*, 1904-5).

A i (d) 1. Large example :

Edgar, *Cat.*, no. 32589.

A i (d) 2. Large examples :

Edgar, *Cat.*, no. 32588.

Wainwright, nos. J 47098 c, 47099 d, e, 47105 b, type 1 B, pp. 70-1.

A ii and iii. None.

<sup>1</sup> Wulff, p. 242, pl. lviii, no. 1209. This example is abnormal in having no suggestion of a constriction or tool mark at the base of the neck. Yet from its shape it belongs to group A rather than to group B.

<sup>2</sup> Woolley and MacIver, *Karanòg*, pl. xxxix, grave G 503, Cairo J 40092.

which is blown into a mould of knobbed-honeycomb pattern like no. 628, p. 213 below. To group i (c) belongs a large yellowish colourless flask in Cairo from Karanis (no. J 41061; see App., p. 314) of fabric 3 with a geometrical pattern in scratched technique (Fig. 3, l). Of the group with plain base and rounded rim, i (d), there are undecorated examples in Edgar (no. 32587, small) and in the Askren collection (Mich. 5242; see App., p. 323): the latter is probably of early date—perhaps first century—for it is paralleled by numerous examples found at Pompeii and on other early sites. Also in the Askren collection (Mich. 5136; see App., p. 322) is a fragmentary vase, large, of green glass with vertical corrugations on the body and a coil on the shoulder. In the Egyptian Museum, Berlin, is a fine example (no. 19360, from Philadelphia in the Fayûm) of colourless glass with geometrical cut decoration (Fig. 3, h). It has a cut-out roll at the rim. This can be paralleled by a very similar flask in Oxford from Syria (no. 1912.69), with similar cut decoration and cut-out roll, but with a deep cut-in at the base of the neck instead of the usual constriction (Fig. 3, m).

Several new types can be added to division ii from other sources. Edgar published a small colourless flask (no. 32606) which has a rim folded inward and a solid, slightly concave base ring, and there are two others of the same type in the Askren collection (Mich. 5246 and 5248; see App., p. 323). Wainwright's hoard contained an example like no. 588, but without a shoulder coil (no. J 47097 a, type i c), and another piece (no. J 47101 b, type i d) which gives a guide for the restoration of the pushed-in bases like no. 589 (p. 207, where a full description of J 47101 b will be found).

A variant type of flask on base coil with folded rim but no decoration, published by Petrie from Gurob,<sup>1</sup> is now in the British Museum, and a similar flask but with shoulder coil and pinches on the body was found at Riqqeh.<sup>2</sup> Further, two base-coil flasks with rounded rim and cut-out roll below can be quoted: one, from the same Gurob group as the previous piece,<sup>3</sup> has decoration of horizontal wheel incisions on the body, and another, in Edgar (no. 32590, from the Fayûm), has a spiral coil on the rim and neck.

This type of flask with a constriction at the base of the neck though proportionately rarer than type B outside Egypt, is yet found

<sup>1</sup> Petrie, *Illahun*, pl. xxxiii, 5.

<sup>2</sup> Engelbach, *Riqqeh*, p. 20, pl. xxii, 26; now in Manchester, no. 5847.

<sup>3</sup> Petrie, *ibid.*, no. 3; now in the British Museum.

sporadically in both large and small sizes. The inverted-piriform shape of body is very rare, apart from vases of heavy fabric such as Kisa's forms A 20 and 30 and Morin-Jean's forms 21 and 26, which belong rather to class XIII B,<sup>1</sup> and the small flasks of millefiori or fine monochrome wares of early date, which, like most fine first-century fabrics, were probably made in Alexandria. It is found occasionally, however, in cheap, light wares of non-Egyptian fabric. Large examples may be seen in Avignon,<sup>2</sup> in St. Germain,<sup>3</sup> and in the Victoria and Albert Museum:<sup>4</sup> small examples from Strasbourg are illustrated by Straub,<sup>5</sup> and there are others in Cologne.

Globular bodies are commoner. Morin-Jean lists such a type as a variant of his form 40 which has no constriction at the base of the neck.<sup>6</sup> This type has the cylindrical neck and everted, folded rim of the Egyptian pieces, and is usually plain. A flask with cut decoration in the Vom Rath collection in the Berlin Antiquarium<sup>7</sup> has a rounded rim with cut-out below, a deep cut-in at the base of the neck, and a globular body with flattened base. It is thus akin in all but shape of body to the flasks (Fig. 3, h, m) from Egypt and Syria. Some other slight variants of this general shape occur, such as are illustrated by Kisa, forms A 64, and B 68, 72, and 73.

A more usual type than any of the foregoing is one which so far is not known at Karanis or elsewhere in Egypt.<sup>8</sup> This is Morin-Jean's form 41 and Kisa's B 69-70, with globular body, cylindrical neck and plain polished rim, which occurs regularly in the west during the last two centuries of the Empire.<sup>9</sup> It also occurs frequently during the same period on Syrian sites,<sup>10</sup> side by side with a variant form which has a rim folded outward, downward, and upward.<sup>11</sup>

<sup>1</sup> See p. 265 f. below.

<sup>2</sup> From Padua, wine-coloured glass.

<sup>3</sup> No. 30137, from Ventimiglia, colourless glass.

<sup>4</sup> Beck loan, no. 381, from Cologne, dark green glass.

<sup>5</sup> Straub, *Strasbourg*, p. 46, pl. vii, 4 (plain), and p. 62, pl. xi, 1 (with thumb indents).

<sup>6</sup> Morin-Jean, p. 92, fig. 109: 'une variante assez répandue comporte un goulot étranglé du bas.' This is Kisa's form B 67.

<sup>7</sup> Kisa, *Vom Rath Cat.*, no. 173, pl. xviii, no. 153, probably from Cologne.

<sup>8</sup> Three examples (nos. 32579-81) occur in Edgar's catalogue, but none has a definite Egyptian provenance, so they cannot be admitted as evidence.

<sup>9</sup> Morin-Jean, p. 94 f. For illustrations see *ibid.*, figs. 110-11 and 338 D; Lehner, *Führer*, i<sup>2</sup>, pl. xviii, 1 and 2, with painted decoration (= Kisa, fig. 345); and Niessen *Cat.*, nos. 332, pl. xxiv, and 540-8, pl. xl.

<sup>10</sup> E.g., no. G 1935 in Toronto, no. C 38. 1927 in the Victoria and Albert Museum, and Cesnola, *Atlas*, iii, pl. xcvi, 8 (from Idalium).

<sup>11</sup> E.g., Niessen *Cat.*, no. 1061, pl. lii, and Froehner, *Gréau Cat.*, no. 1518, pl. cclxvi (from Cyprus).

In group B, which also includes both large and small vases, plain bases and coil bases are equally common. Of the flasks with plain bases (division i) all except one fragmentary example have rims folded inward; of the coil-base flasks (division ii) all except one fragmentary example have cut rims; the one exception in each case has a rounded rim. Many of the examples were entirely undecorated, while others had simple decorations consisting of corrugations, coils and threads, raised ribs, or mould-blown patterns.<sup>1</sup>

Here again there are examples of every fabric except number 9. Both large and small vases occurred belonging to fabric 3, 4, or 5, but only small examples and comparatively few of them occurred belonging to fabric 1, 2, or 8.

The large pieces of fabric 3, 4, or 5 must be of late date, i.e. fourth to fifth century, like their counterparts in group A and for the same reasons. The small vases of fabric 1 or 2 are earlier, but probably not before the third century, for most of them are made of poor, bubbly material: the pieces of fabric 8 should be of that date too. One or two examples of each of these fabrics were found in B-period houses of 1926. The small vases of fabric 3, 4, or 5 were, however, found in the higher levels only and must be dated, along with the large examples of those fabrics, to the fourth or fifth century.

We see, therefore, once again, a small type originally used for toilet purposes being adapted at a later period and in larger sizes to the usage of the table, and at the same time continuing to be made in a small size, but in new fabrics, for its original purpose.

Examples belonging to this group are no less common in other Egyptian collections, and in many instances they are valuable in helping to restore fragmentary Karanis specimens. For the most part they correspond exactly to one or other of the Karanis types,<sup>2</sup> but as in group A there are a few variants which call for special mention.

To division i (a) belongs a small flask (Edgar, no. 32520) which

<sup>1</sup> Corrugations are found only on large vases; raised ribs and mould-blown patterns only on small vases; coils and threads on both large and small.

<sup>2</sup> The following is a list of those noted:

B i (a) 1. Both large and small examples:

Edgar, *Cat.*, nos. 32518, 32523, 32531, 32584-6, 32605, 32750 (blue), 32786, and 32787 (this last from Karanis).

Wainwright, nos. J 47097 f, 47100 d, types 5 D and 12.

Cairo, J 45771; see App., p. 315.

Askren collection, Mich. 5219-29, 5237; see App., p. 323.

British Museum, bought in 1887.

*Note continued on next page.*

bears horizontal wheel-cut lines, and to division i (b) another (no. 32783, from Karanis) which has a vertical, rounded rim and vertical ribs at the bottom of the body. Two vases in Cairo from Karanis, J 40444 (Fig. 4, b) and J 45772 (see App., p. 315), are plain and have a concave funnel rim, rounded at the lip, and a third of the same type is in the Kaiser Friedrich Museum, Coptic Section.<sup>1</sup> Two small, colourless, cut flasks from Hawara fall in this division but have plain, polished rims. The decoration is finely cut and consists, on the one,<sup>2</sup> of horizontal wheel cuts on the neck and body, and on the other,<sup>3</sup> of two horizontal wreaths, one on the neck and one on the shoulder, vertical fluting on the body, and a cruciform flower on the base. Finally, the flask in the Askren collection (Mich. 5152; see App., p. 325) is of a unique type, parallel in fabric and decoration to the lamps with blue blobs of class VI.

*Note continued from previous page.*

Philadelphia, 2800 (from the Fayûm).

Boston, 24. 373 (from Gamai, Nubia).

Musée Guimet, one example.

Petrie, *Hyksos*, p. 41, pl. xxxviii A, grave 725.

*Id.*, *Memphis*, p. 15, pl. li, 27.

Brunton, *Qau and Badari*, iii, p. 28, pl. xl ix, 10 and 11 (from grave 1907, Hemamieh).

B i (a) 2. Both large and small examples:

Edgar, *Cat.*, nos. 32519, 32521, 32568-70, 32751.

B i (a) 3. Large examples:

Cairo, J 41069; see App., p. 315.

Wainwright, J 47097 b, c (the latter green with blue coil), type 2 B, 47105 c, type 2 A.

B i (a) 4. None.

B i (a) 5. Large examples:

Edgar, *Cat.*, nos. 32565, 32567.

Cairo, J 46475 and 48218 (Fig. 4, a); see App., p. 315.

Askren collection, Mich. 5155 (shape as for Cairo, J 48218); see App., p. 324. British Museum, given by H. W. Murray, 1926.

Brussels, E 433 (from the Fayûm, 1901-2), with coil at rim, E 5331 (from Antinoë, 1913-14), with spiral coil on neck.

Petrie, *Hyksos*, p. 41, pl. xxxvii B (with coil at base of neck) and pl. xxxviii A (now in Manchester, no. 3358).

B i (a) 6. Small examples:

Edgar, *Cat.*, 32524-5.

B i (a) 7. Large and small examples:

Edgar, *Cat.*, 32572-3.

Victoria and Albert Museum, 345. 1900 (bought, Myers collection).

None of the B ii types can be directly paralleled elsewhere.

<sup>1</sup> Wulff, no. 1211, pl. lviii.

<sup>2</sup> Now in the Petrie collection, University College, London.

<sup>3</sup> Petrie, *Roman Portraits*, p. 20, pl. xiv; now in Edinburgh, 1911. 210. 4 m.

Four flasks in the British Museum group from Gurob belong to division ii. One has a rounded rim (type (a)) and is undecorated.<sup>1</sup> The others have folded rims, a variety not represented as yet at Karanis. Two of these are decorated with a coil at the base of the neck and vertical pinches on the body, and the third is mould-blown, in the form of a janiform male head.<sup>2</sup> Yet another variant of this type with folded rim, this time with a trailed-on spiral thread on the neck, is published in Wainwright's hoard (no. J 47096 a).

This shape of flask is exceedingly common at all periods and throughout the Empire. Most of the examples are undecorated and have a plain base (B i (a) 1), but vases with coil bases and pushed-in bases are never uncommon, and simple decorations, such as coils, corrugations, and thumb indents, were used with regularity.

The types with plain base are represented in Morin-Jean's list by forms 37-40,<sup>3</sup> and in Kisa's by forms A 37-41, 54-62, and B 77-8 and 80. Early examples have a folded rim, later examples have either a folded or an unworked rim. Particularly characteristic of the later Roman period is Morin-Jean's type 40 (see his fig. 104), with unworked rim and concave neck, tapering downward. The commonest kinds of decoration are corrugations,<sup>4</sup> trailed-on coils or threads,<sup>5</sup> incisions or cuts,<sup>6</sup> thumb indents,<sup>7</sup> pinched knobs,<sup>8</sup> ribs,<sup>9</sup> and mould-blown patterns.<sup>10</sup> Within the last of these groups falls the important series of head-vases, of which one noteworthy example has been found at Karanis, no. 629.

<sup>1</sup> Petrie, *Illahun*, pl. xxxiii, 8; now in the British Museum.

<sup>2</sup> *Ibid.*, nos. 11 and 15, and 7 respectively; now in the British Museum.

<sup>3</sup> See Morin-Jean, pp. 90-4, for a general account of this group.

<sup>4</sup> Morin-Jean, fig. 103; Niessen Cat., no. 184, pl. xii; Froehner, *Charvet Cat.*, pl. xxvii, no. 110 (from Montmerle); Victoria and Albert Museum, Beck loan, no. 528 (from Palestine); Mayence, no. 25. 154 (from Mayence); Bonn, no. 17290.

<sup>5</sup> Morin-Jean, fig. 104 (from Cologne); Kisa, figs. 91 (from Italy), 92 and 106 (from Syria ?), 107 (Breslau Museum), and 114-15 (snake-thread ware, Vom Rath coll.); Victoria and Albert Museum, no. 1060. 1898 (from Mt. Carmel, rim coil only); Toronto, nos. G 1802-4 (from Syria (?), neck coils); Niessen Cat., no. 118, pl. xxxv.

<sup>6</sup> Morin-Jean, fig. 104 (from Mayence, wheel incisions and inscription, CURRE PUERUM).

<sup>7</sup> Niessen Cat., no. 227, pl. xviii.

<sup>8</sup> Fremersdorf, *Röm. Gläser*, fig. 31.

<sup>9</sup> Fremersdorf, *Denkmäler*, fig. 9.

<sup>10</sup> These, including their sub-group, the head-vases, are fully treated by Kisa, pp. 751 ff., and Morin-Jean, pp. 148 ff. The various types are illustrated by Kisa, figs. 290-6, 299 (head-vases), 307 (monkey), and 311 (grape-cluster); Morin-Jean, figs. 205, 207, 209, and 211 (all head-vases); Niessen Cat., pls. xxi (head-vases) and xxxvii and lii, no. 1056 (grape-cluster). Compare also a wine-coloured flask in Marseilles with honeycomb and interlaced-circle decoration (no. 445, from Provence) and de Ridder, nos. 280 ff., p. 158, pl. xii.

The types with coil base and pushed-in base<sup>1</sup> fall strictly into line with the above groups, and do not really merit any typological differentiation. Plain examples are illustrated by Morin-Jean<sup>2</sup> and by Kisa,<sup>3</sup> and from the Niessen collection,<sup>4</sup> and decorated examples also from the Niessen collection,<sup>5</sup> and by Morin-Jean.<sup>6</sup>

The base fragments grouped at the end, c, do not belong to known shapes of either of the two preceding groups. Most of them probably come from vessels of class IX; some may belong to one-handled jugs, XI, or to two-handled flasks, XII. Until more fully preserved examples of the types involved are forthcoming, it is fruitless to attempt any restorations.

They vary in date. Some (e.g., the pushed-in bases, and those on pinched toes) belong to fabric 2 or 8, and are probably early. The rest belong to fabric 3, 4, or 5, and are therefore later.

#### SKELETON CLASSIFICATION

##### A. Tall-necked flasks with constriction at base of neck

- 1. Plain base, usually more or less concave
  - (a) Folded rim, inward
    - 1. Plain
    - 2. Thumb-indented or flat-sided bodies
    - 3. Shoulder collar
    - 4. Shoulder collar, and raised pinches on body
    - 5. Coil at rim
    - 6. Coil at rim, and raised pinches on body
    - 7. Coil at rim, and horizontal wheel incisions on body
    - 8. Raised ribs on body
    - 9. Decoration of trailed-on threads
    - 10. Decoration of trailed-on and marvered-in threads
  - (b) Folded rim, outward and downward
  - (c) Folded rim, outward, downward, and upward
    - 1. Plain
    - 2. Thumb indents on body
    - 3. Horizontal wheel cuts or incisions
  - (d) Rounded rim
    - 1. Coil at rim, and corrugations on body
    - 2. Coil at rim, and no corrugations on body
    - 3. Other fragmentary types with rounded rim

<sup>1</sup> Kisa, forms A 43 and B 75, 76, and 79, and Morin-Jean, pp. 91-4. It is rarely possible from a photographic illustration to distinguish between these two types of base, so they are therefore treated together here.

<sup>2</sup> Morin-Jean, figs. 105-7.

<sup>3</sup> Kisa, fig. 68.

<sup>4</sup> Niessen Cat., no. 560, pl. xl.

<sup>5</sup> Niessen Cat., nos. 116, 119, pl. xxxv (added threads), and no. 582, pl. xxxviii (wheel incisions).

<sup>6</sup> Morin-Jean, fig. 256 (thumb indents).

- II. True base ring
- III. Pushed-in base
- IV. Coil base
- B. Tall-necked flasks with no constriction at base of neck
  - I. Plain base
    - (a) Folded rim, inward
      - 1. Plain
      - 2. Corrugations on body
      - 3. Corrugations on body, and coils
      - 4. Corrugations and thumb indents on body, and coils
      - 5. Coils
      - 6. Raised ribs on body
      - 7. Mould-blown decoration
    - (b) Rounded rim
  - II. Coil base
    - (a) Rounded rim
    - (b) Unworked rim
      - 1. Plain
      - 2. Coil at base of neck, corrugations on body
    - (c) Fragmentary coil bases
- C. Miscellaneous base fragments
  - I. Base ring
  - II. Pushed-in bases
  - III. Solid bases
  - IV. Bases on pinched toes
    - (a) Three toes
    - (b) Four toes
    - (c) Five toes
    - (d) Ring of small toes

#### A. TALL-NECKED FLASKS WITH CONSTRICTION AT BASE OF NECK

Bodies are chiefly inverted-piriform, but occasionally more bulbous or globular in contour.

##### I. PLAIN BASE, USUALLY MORE OR LESS CONCAVE

###### (a) FOLDED RIM, INWARD

###### 1. Plain

The following complete and fragmentary examples were listed. Other fragments, of both large and small vases, were very numerous.

516. 26/A 3/G Mich. 5561.

PLS. VII and XVII

Greenish colourless; cracked; spots of incipient iridescence; bubbly; few impurities; blowing spirals noticeable.

H. 0.204 m. G.D. 0.141 m. A.T. neck 0.002 m.

Rim well outspayed from neck and folded upward and inward. Neck cylindrical,

with horizontal constriction<sup>1</sup> at its base. Body inverted-piriform, with slightly concave sides expanding in diameter downward. Plain concave base. No pontil technique. No decoration, but an accidental splotch of blue glass on rim. A fine, symmetrical piece.

Fabric 3.

**517.** 28/B 134 A\*/N.

Fragment of base, as no. 576, dark blue glass. Fabric 7.

**518.** 28/131\*/F.

Fragment of neck and body, as no. 576, but smaller, and purple glass. Fabric 6.

**519.** 25/5043 C/B Mich. 5566.

Brownish yellow; intact; pitted on rim; bubbly, and many black impurities.

H. 0.084 m. G.D. 0.048 m. A.T. 0.0015 m.

Shape as no. 516, but much smaller, and very asymmetrical. Sides of body hardly concave at all; base almost flat. An accidental dent in one side.

Fabric 5.

**520.** 24/169 A/I Mich. 5567.

Colourless; chip out of rim; dirty, no weathering; pin-prick bubbles; no impurities.

H. 0.043 m. G.D. 0.025 m. A.T. 0.002 m.

Shape as no. 516, but constriction at base of neck not so marked. Pontil technique.

Fabric 2.

**521.** 26/B 18 F/R Mich. 5568.

PLS. VII and XVII

Greenish colourless; intact; incipient pitting weathering; material as no. 520.

H. 0.029 m. G.D. 0.019 m. A.T. 0.002 m.

Shape as no. 516, but a very small vase. Post technique.

Fabric 2 or 3 (?).

**522.** 26/B 16 F/N Mich. 5569.

Colourless with greenish tinge; rim missing; frosted in parts; material good; few bubbles.

H. 0.047 m. G.D. 0.029 m. A.T. 0.001 m.

Shape as no. 516. Pontil technique.

Fabric 2.

**523.** 28/136\*/E Mich. 5960.

Colourless with greenish tinge; rim missing; strain cracks, no weathering; pin-prick bubbles.

H. 0.062 m. G.D. 0.039 m. A.T. neck 0.002 m.

Shape as no. 516. Part of base of flask snapped off with pontil, leaving centre of base very thin.

Fabric 2.

**524.** 28/B 152 A\*/D Mich. 5961.

Greenish colourless; rim missing; strain cracks, spots of milky iridescence; many pin-prick bubbles.

H. 0.025 m. G.D. 0.017 m. A.T. neck 0.001 m.

Shape as no. 516 but a very small vase. Flat base with neither post nor pontil technique visible.

Fabric 2 or 3 (?).

<sup>1</sup> In this and in all the following examples the marks of the tool (probably a reamer) which made the constriction are plainly visible.

The following fragmentary specimens of similar flasks, all small, should be mentioned:

**525.** 26/B 36 C/G Mich. 6132.

26/B 26 F/N Mich. 6123.

Greenish colourless; rim, neck, and part of body; (a) no weathering, (b) frosted; very bubbly.

H. c. 0.07 m.

Fabric 8.

**526.** 24/5007 A/O Mich. 5818.

24/5050 B/F Mich. 5793.

Bluish green; rim, neck, and part of body; enamel-like weathering in spots; very bubbly.

H. c. 0.07 m.

Fabric 8.

**527.** 24/5010 B<sup>2</sup>/E Mich. 5678.

Pale green; rim and neck; no weathering; very bubbly indeed; full of black impurities and much stone.

H. c. 0.10 m.

Fabric 9.

**528.** 24/5050 A/I Mich. 5814.

Green; rim, neck, and part of body; no weathering; material fair.

H. c. 0.06 m.

Fabric 4.

**529.** 26/B 1 B/H Mich. 6076.

Purple; fragment of rim and neck, and fragment of base; no weathering; bubbly.

H. c. 0.05 m.

Fabric 6.

**530.** 27/C 53 C/B1 Mich. 6190.

PL. XVII

Greenish; rim, neck, and part of body; no weathering; bubbly.

H. of neck 0.042 m. A.T. 0.001 m.

Rim folded inward. Neck roughly cylindrical, but with faintly curved sides, concave at top, convex below. Constriction at base of neck. Body probably spherical.<sup>1</sup>

Fabric 8.

## 2. *Thumb-indented or flat-sided bodies*

The two following examples occurred; there were no other recognizable fragments.

**531.** 24/5012 J/I Mich. 5570.

PLS. VII and XVII

Colourless with greenish tinge; cracked; no weathering; material fair; some traces of stone.

H. 0.047 m. G.D. 0.028 m. A.T. 0.001 m.

Rim and neck as no. 516. Body originally almost globular, but four thumb indents on the sides have given it a roughly rectangular section. Pontil technique. Base flat.

Fabric 2.

<sup>1</sup> Like, e.g., Edgar, *Cat.*, nos. 32610-11.

532. 28/C 35 C/G Mich. 6233.

PL. XVII

Colourless with faint green tinge; fragment of rim, neck, and body; no weathering; material bad; full of bubbles and impurities.

H. c. 0.045 m. A.T. 0.0007 m.

Rim and neck as no. 516. Body originally inverted-piriform but flattened to an oval horizontal section by pressure on two sides. Base missing.

Late fabric 2.

3. *Shoulder collar*

Of this and the following sub-type (4) four complete examples were found. Numerous fragments, unlisted, also occurred, including many fragments of shoulder collars.

533. 27/209 C/LI Mich. 5938.

PLS. VII and XVII

Greenish colourless, with darker green collar; intact; no weathering; bubbly, but few impurities.

H. 0.16 m. G.D. 0.096 m. A.T. neck 0.001 m.

Rim outsplayed horizontally and folded upward and inward. Neck tall and cylindrical, with constriction at base. Body nearly spherical with greatest diameter in centre. Base concave, no pontil technique. On shoulder a trailed-on collar of dark green drawn glass, on which are nine vertical, pinched-out flaps. A very symmetrical piece.

Fabric 3.

4. *Shoulder collar, and raised pinches on body*

534. 28/C 42 F/A Mich. 5937.

PLS. VII and XVII

Pale green, with green collar; two small radiate cracks caused by blobs of impurities; contents residue, no weathering; very bubbly; some bad impurities.

H. 0.243 m. G.D. 0.16 m. A.T. 0.0015 m.

Shape as no. 533, but with concavity in upper part of sides of body. Collar on shoulder of green drawn glass with eight pinched flaps. In a row round centre of body six faint vertical pinches, each c. 0.03 m. long.

Fabric 5.

535. 26/BC 61 D/B Mich. 5563.

Light yellow with greenish collar; intact; no weathering; material fair; some pin-prick bubbles and impurities.

H. 0.23 m. G.D. 0.143 m. A.T. 0.0015 m.

Shape as no. 533, but upper part of sides of body straight. Shoulder collar of greenish drawn glass with seven pinched flaps. In a row round centre of body six sloping pinches, each c. 0.02 m. long.

Fabric 4.

536. 27/209 C/MI Mich. 5936.<sup>1</sup>

Yellow with dark green collar; intact; usage scratches and brown contents residue, no weathering; bubbly, with impurities.

H. 0.25 m. G.D. 0.16 m. A.T. 0.001 m.

Shape as no. 533. Shoulder collar of dark green drawn glass with eight pinched flaps. In a row round centre of body five vertical pinches, each c. 0.05 m. long.

Fabric 5.

<sup>1</sup> A palm-fibre wad, used as a stopper, was found in place in the mouth of this vase.

5. *Coil at rim*

Of this and the next type, which are not always distinguishable from each other, the following specimens were listed. Numerous fragments occurred.

**537.** 27/B 121 K/E Mich. 5939.

PLS. VII and XVII

Greenish colourless; small internal crack in body; dirty, no weathering; bubbly with black impurities; blowing spirals noticeable.

H. 0.226 m. G.D. 0.148 m. A.T. neck 0.002 m.

Shape as no. 533, but rim more sloping. Shortish neck, with a rather deep constriction at base. Sides of body slightly convex near top. A coil of similar glass added on under side of lip.<sup>1</sup>

Fabric 3.

**538.** 27/B 121 K/D Mich. 5941.

As no. 537, except in dimensions.

H. 0.22 m. G.D. 0.155 m. A.T. neck 0.0015 m.

**539.** 28/B 158 A/H Mich. 5940.

Greenish colourless, with blue coil streaked with green; intact; brownish contents stain, no weathering; very bubbly; some impurities, especially at rim and in coil; blowing spirals noticeable.

H. 0.215 m. G.D. 0.16 m. A.T. neck 0.002 m.

Shape as no. 533. A coil of blue drawn glass streaked with green is added on under side of rim.

Fabric 3.

Two fragments of the neck and rim of smaller specimens were listed.

**540.** 24/148 F/D Mich. 5868.

Yellowish with bluish green coil at rim; no weathering; bubbly.

H. of whole c. 0.07 m.

Shape as no. 533, but rim only partly folded.

Fabric 5 (?).

**541.** 27/cs 63<sup>3</sup>/M Mich. 6222.

Greenish colourless with bluish green coil at rim; no weathering; bubbly.

H. of whole c. 0.06 m.

Shape as no. 533.

Fabric 8 (?).

6. *Coil at rim, and raised pinches on body*

**542.** 27/C 51 C/A Mich. 5942.

PL. XVII

Greenish colourless with some yellowish streaks, green coil; part of rim missing; dark brown, powdery contents residue, dulled, no weathering; bubbly, with some impurities; traces of stone.

H. 0.215 m. G.D. 0.134 m. A.T. neck 0.003 m.

<sup>1</sup> A coil in this position would have the effect of strengthening the rim, as Wainwright aptly remarks, *Le Musée Egyptien*, iii, 72.

Shape as no. 533, but rim almost horizontal. Green coil on under side of rim.

In a row round body nine raised vertical pinches, each c. 0.08 m. long, and not symmetrically placed.<sup>1</sup>

Fabric 3.

*7. Coil at rim, and horizontal wheel incisions on body*

Only the following fragmentary specimen occurred:

**543.** 27/C 45 B/W Mich. 6180.

PL. XVII

Colourless with greenish tinge, bluish green coil; rim, neck, and part of body; no weathering; fairly bubbly.

H. c. 0.065 m. G.D. 0.052 m. A.T. 0.0008 m.

Shape as no. 533, with three groups of horizontal wheel incisions on body. On under side of rim a bluish green coil.

Late fabric 2.

*8. Raised ribs on body*

Only fragmentary specimens occurred; all are listed.

**544.** 25/331 B/Q Mich. 6055.

PL. XVII

Colourless with greenish tinge; body and base of neck; no weathering; material good; few bubbles.

H. c. 0.062 m. G.D. 0.045 m. A.T. 0.001 m.

Rim and top of neck missing. Neck cylindrical with constriction at base. Body inverted-piriform with straight sides. Base slightly concave. On body and neck nine vertical raised ribs, not evenly spaced.

Fabric 2.

**545.** 27/C 65 M/E Mich. 6214.

PL. XVII

Greenish; parts of rim, neck, body, and base in fragments; strain cracks, no weathering; very bubbly.

H. c. 0.10 m. A.T. 0.001 m.

Shape as no. 533; pontil technique. Series of vertical raised ribs from base of neck to junction of body and base, faintly pressed out at tip but thickening toward bottom, where they curve round to meet each other in a U-formation.

Fabric 8.

**546.** 24/136 O/M Mich. 5872.

28/165\*/T.

Two base fragments as no. 544, the former greenish colourless, late fabric 2, the latter purplish, fabric 6.

**547.** 28/BS 160/N1 Mich. 6231.

PL. XVII

Colourless with green tinge; fragment of base; no weathering; very bubbly and full of stone.

G.D. c. 0.07 m. A.T. 0.001 m.

Shape as no. 544. The ribs here curve round at bottom to the left only and are deeply 'undercut' on that side.<sup>2</sup>

Very bad fabric 2 (?).

<sup>1</sup> These pinches are in high relief and not low and unobtrusive, as are those of type 4 above.

<sup>2</sup> On this example the technique may be seen very plainly. The reamer was run

**548.** 24/4029 G<sup>1</sup>/W.

Dark blue; numerous fragments, comprising most of body and base of neck; contents residue, no weathering; bubbly.

H. c. 0.16 m. A.T. 0.0006 m.

Shape as no. 544, but base concave without pontil technique. Seven (?) raised vertical pinched ribs reaching from base of neck to greatest diameter. Good, symmetrical shape.

Fabric 7.

**549.** 28/C 49 G/D.

Some body fragments as no. 548, greenish. Fabric 8.

**550.** 24/5006 A/AA Mich. 5841.

PL. XVII

Greenish colourless; fragment of base and lower part of body; scratched, no weathering; bubbly.

G.D. 0.052 m. A.T. 0.0015 m.

Shape probably as no. 544, but base concave with pointed kick and pontil technique.

Five (?) raised vertical pinched ribs on body, each double and ending in fork at bottom.<sup>1</sup>

Fabric 2 or 3 (?).

**551.** 25/239 A/C Mich. 6034.

Fragment of base as no. 544, greenish. Fabric 2 or 3.

**552.** 26/B 3 L/J Mich. 6086.

PL. XVII

26/B 3 E/U Mich. 6085.

Bluish green; two base fragments, perhaps from same flask; frosted; very bubbly.

H. c. 0.12 m. A.T. 0.001 m.

Shape probably as no. 544. Thick concave base with pontil technique. Closely set, spiral ribs on body, made with reamer.

Fabric 8.

### 9. *Decoration of trailed-on threads*

Only fragmentary examples occurred; all are listed.

**553.** 26/B 3 E/U Mich. 6085.

PL. XVII

Greenish colourless; fragment of body; no weathering; bubbly.

G.D. 0.055 m. A.T. 0.0015 m.

Shape as no. 544. Thread of similar glass trailed-on spirally round vase; the thread partly fused in after application.

Fabric 8.

down the body vertically, causing a furrow and a resultant rib to the right of it. At the bottom this furrow curves round to the left. On the better-made examples, e.g., no. 544, a slight secondary furrowing was made on the other side of each rib, thus producing a more even and symmetrical effect.

<sup>1</sup> The reamer was first run down the body and turned to the right at the bottom to form the right half of the rib; the process was then repeated to the left of the first furrow, but the reamer was this time turned left and not right at the bottom. A similar type of branching rib is found on the base of a bowl in Bonn (no. 17293), Lehner, *Führer*, i<sup>2</sup>, 224, and Kisa, fig. 368.

554. 26/B 3 E/U Mich. 6085.

Fragment<sup>1</sup> as no. 553, greenish colourless. Fabric 8.

555. 25/278 D/F Mich. 6049.

Fragment as no. 553, green. Fabric 8.

556. 24/5012 A/D Mich. 5864.

Fragment as no. 553, yellowish. Fabric 3.

557. 28/130\*/M Mich. 6223.

Dark green with opaque yellow threads; fragment of rim and fragment of base; no weathering; very bubbly.

G.D. c. 0.085 m. A.T. 0.001 m.

Fragment of rim and fragment of base as no. 544. Spiral thread of opaque yellow glass trailed on horizontally, beginning underneath rim and ending on base.

Fabric 5.

558. 26/B 5 G/J Mich. 6096.

Fragment of base as no. 557, deep purple with opaque yellow thread. Fabric 6.

PL. XVII

#### 10. *Decoration of trailed-on and marvered-in threads*

Only two small body fragments occurred:

559. 24/5048/AQ Mich. 5827.

Colourless with greenish tinge, opaque white threads; two body fragments; milky iridescence, specially on threads; pin-prick bubbles.

Shape as no. 544. Spirals of creamy white on body, trailed on and marvered in before blowing and then blown with vase.

Fabric 2.

560. 24/5048/AQ Mich. 5827.

Colourless with greenish tinge, opaque white threads; fragment of body; no weathering; pin-prick bubbles.

Shape as no. 544. Decoration as no. 559 but in festoons and not spirals.

Fabric 2.

#### (b) FOLDED RIM, OUTWARD AND DOWNWARD

Only the following fragmentary specimen occurred:

561. 28/152\*/AII.

Pale bluish green; fragment of rim and neck; no weathering; very bubbly.

H. of whole c. 0.09 m. A.T. 0.0015 m.

Rim outspayed at angle of 45°, and folded outward and downward in solid fold.

Neck cylindrical with constriction at base. Body inverted-piriform.

Fabric 8.

<sup>1</sup> This flask was broken in antiquity across the junction of the neck and body, and the body alone re-used, after the sharp edge left at the fracture had been ground down.

## (c) FOLDED RIM, OUTWARD, DOWNWARD, AND UPWARD

The following complete and fragmentary examples, with or without thumb indents or horizontal wheel incisions, occurred, besides numerous smaller fragments:

1. *Plain*

**562.** 24/130 C/H Mich. 5572.

PLS. VII and XVII

Colourless; intact; contents stain, no weathering; material good.

H. 0.053 m. G.D. 0.03 m. A.T. 0.0015 m.

Rim folded outward, downward, and upward from top of neck. Neck cylindrical with constriction at base. Inverted-piriform body. Thick base, very slightly concave. Pontil technique.

Fabric 2.

**563.** 28/CS 100/OI Mich. 6239.

Two fragments as no. 562, flask slightly larger. Fabric 2.

**564.** 26/B 27 C/P Mich. 5571.

Bluish green; intact; contents stain, no weathering; bubbly; few impurities.

H. 0.059 m. G.D. 0.04 m. A.T. 0.002 m.

Shape as no 562. Base more concave.

Fabric 8.

**565.** 24/4039/J Mich. 5752.

Fragment of rim and neck, as no. 562, bluish green. Fabric 8.

**566.** 24/5011 E/L Mich. 5820.

PL. XVIII

Colourless with greyish tinge; fragment of rim and neck; no weathering; material good; a few pin-prick bubbles.

D. rim 0.048 m. A.T. neck 0.003 m.

Rim outspayed at angle of 45° and folded outward, downward, and upward. Short cylindrical neck with deep cut-in at base, leaving a very small opening between neck and body. Body lost, but probably inverted-piriform. Traces of polishing on rim.

Fabric 1.<sup>1</sup>

**567.** 24/169 A/G Mich. 5450.

Fragment of rim and neck,<sup>2</sup> as no. 566. Colourless with greenish tinge. Fabric 1.

2. *Thumb indents on body*

**568.** 26/B 55 C/A Mich. 5573.

PLS. VII and XVIII

Colourless with slight green tinge; cracked and small hole in neck; spots of milky weathering; material fair.

<sup>1</sup> This is the same thick colourless ware with the same dull-polished finish as that of the plates I B i and ii, the bowls II A v, &c.

<sup>2</sup> Technically interesting as showing on one fracture the rim fold with a slight hollow (a), and on the other fracture a solid triangular rim with no trace of the original fold (b). Examples such as this suggest that all the so-called thickened rims were made by folding.

H. 0.048 m. G.D. 0.023 m. A.T. 0.001 m.

Rim folded outward, downward, and upward from top of neck. Neck cylindrical with constriction at base. Body originally inverted-piriform but made roughly rectangular in section by four thumb indents in sides. Base concave. Pontil technique.

Fabric 2.

**569.** 26/B 2 H/YI Mich. 6078.

PL. XVIII

Bluish green; one fragment of rim, neck, and shoulder, one fragment of base and lower part of sides; no weathering; bubbly.

H. c. 0.05 m. A.T. 0.0008 m.

Shape as no. 568, but body nearly globular.

Fabric 8.

**570.** 24/5006 A/AA Mich. 5841.

Fragment of rim, neck, and body, as no. 568, green. Fabric 5.

### 3. *Horizontal wheel cuts or incisions*

**571.** 26/B 24 P/J Mich. 6119.

PL. XVIII<sup>1</sup>

Greenish colourless; entire body and neck in six fragments, most of rim missing; well-advanced milky-pitting weathering; very bubbly.

H. c. 0.115 m. G.D. 0.062 m. A.T. 0.002 m.

Rim well outsplayed. Neck cylindrical with constriction at base. Body inverted-piriform with straight sides. Base very slightly concave. No pontil technique. On body five very faint groups of horizontal wheel incisions.

Fabric 8 (?).

**572.** 26/B 20 E/H Mich. 6114.

Colourless with pale green tinge; rim, neck, and part of body in one fragment; no weathering; material poor; very bubbly.

D. rim 0.04 m. A.T. 0.001 m.

Rim outsplayed at angle of 45° and folded as no. 562. Neck and body as no. 571. On shoulder a group of horizontal wheel incisions.

Fabric 9.

Of the numerous fragmentary specimens that occurred with wheel-cut or incised-line decoration, the following were listed:

**573.** 28/B 156 K\*/N.

Colourless with greenish tinge; about two-thirds of vase extant; material fair.

H. c. 0.12 m. G.D. c. 0.065 m.

Shape as no. 562. Groups of horizontal wheel incisions on body.

Fabric 2.

**574.** 24/130 C/P Mich. 5400.

24/5018/M Mich. 5772.

Two body fragments, colourless, with horizontal wheel incisions that are almost true cuts. Fabric 2.

<sup>1</sup> In the figure the rim is restored from the following example.

575. 24/146 A/R Mich. 5858.

Fragment of body and base, greenish colourless, with groups of horizontal wheel incisions. Fabric 8.

576. 26/B 9 Q/C Mich. 6105.

Fragment of body and base, colourless, with horizontal wheel cuts singly and in groups of two. Fabric 2.

577. 28/B 127 C/J.

Fragment of neck, colourless, with rough horizontal wheel cuts, singly, on neck. Fabric 1 (?).

578. 25/331 B/Q Mich. 6055.

Fragment of body and base; body squatter and more bulbous than usual. Colourless. Wheel cuts, singly and in groups, on body. Late fabric 2 (?).

(d) ROUNDED RIM

1. *Coil at rim, and corrugations on body*

The following examples, all large, occurred, besides smaller fragments:

579. 27/C 56 G/DI Cairo J 52754.

PLS. VII and XVIII

Yellowish green; repaired, complete; brown contents stain, traces of enamel-like weathering; bubbly, and many impurities.

H. 0.154 m. G.D. 0.108 m. A.T. neck 0.002 m.

Rounded rim well outsplayed at angle of 45° from neck. Cylindrical neck with constriction at base. Body inverted-piriform with straight sides. Flat base, no pontil technique. On under side of rim a thick coil of similar glass. On body a series of twenty-eight S-shaped corrugations. A fine symmetrical piece.

Fabric 5.

580. 27/C 43 C/A Mich. 6177.

Yellow; in many fragments, perhaps complete; no weathering; bubbly.

H. 0.215 m. G.D. 0.143 m. A.T. neck 0.0015 m.

Shape as no. 579. Thirty S-shaped corrugations on body. Rim dented on one side.

Fabric 5.

581. 25/5083 B/Z Mich. 5564.

Pale green; rim missing, crack in body; stains, no weathering; bubbly, and many impurities.

H. 0.12 m. G.D. 0.083 m. A.T. 0.003 m.

Shape as no. 579. Twenty S-shaped corrugations on body.

Fabric 5.

582. 24/5012 C/G Mich. 5575.

Dark brown; rim and top of neck missing; contents residue, usage scratches, no weathering; bubbly.

G.D. 0.103 m. A.T. neck 0.002 m.

Cylindrical neck, deeply cut in at base, leaving a very small opening between body

and neck. Body squat-spherical with greatest diameter at shoulder. Base concave, without pontil technique. Round the body thirty-three S-shaped corrugations. Fabric 5.

### 2. *Coil at rim, and no corrugations on body*

The following fragments of rims and necks of the same type as the last occurred, but all are from small flasks which probably had no corrugations on the body:

**583.** 24/5051 A/H Mich. 5774.

Green with double coil of similar glass at rim; no weathering; bubbly.

H. of flask c. 0.07 m.

Shape as no. 579.

Fabric 5 (?).

**584.** 27/C 55 A/TII Mich. 6195.

Yellowish colourless with bright green coil at rim; no weathering; very bubbly.

H. of flask c. 0.06 m.

Shape as no. 579.

Fabric 4 (?).

**585.** 28/C 121 G/C Mich. 6241.

Purplish colourless with light green coil at rim; no weathering; pin-prick bubbles.

H. of flask c. 0.09 m.

Shape as no. 579. Part of the shoulder is here preserved and shows no trace of corrugations.

Fabric 6.

### 3. *Other fragmentary types with rounded rim*

Two fragmentary specimens should be mentioned here. The first has a rounded rim without further addition: the second has a cut-out just below the rim. In each instance the shape of the complete vase is uncertain.

**586.** 26/B 48 C/A Mich. 6137.

PL. XVIII

Colourless with greenish tinge; fragment of rim, neck, and part of body; iridescence and milky weathering in parts; bubbly.

H. of neck 0.03 m. A.T. 0.0015 m.

Rim rounded. Neck funnel-shaped with slightly concave sides and constriction at base. Body inverted-piriform and probably rather squat.

Fabric 2 or 3 (?).

**587.** 27/C 55 A/TII Mich. 6195.

PL. XVIII

Greenish colourless; fragment of rim, neck, and part of body; no weathering; bubbly.

H. of neck 0.035 m. A.T. 0.0018 m.

Rounded rim outspayed at angle of 45°. Cut-out in rim just below lip. Neck cylindrical with constriction at base. Body inverted-piriform.

Fabric 1.

II. *TRUE BASE RING*

## FOLDED RIM, INWARD

Only one complete example was found. Probably numerous fragments also occurred, but a fragment of the neck or body would be indistinguishable from one of division i above, while fragments of bases would be indistinguishable from those of deep bowls.

588. 24/5020 c/a Mich. 5565.

PLS. VII and XVIII

Dark green; radiate crack caused by blob of unfused sand; no weathering; very bubbly, with some bad impurities.

H. 0.118 m. G.D. 0.073 m. A.T. 0.003 m.

Rim outsplayed at angle of 45° from neck, and folded upward and inward. Neck cylindrical with constriction at base. Body inverted-piriform with slight concavity in sides near top. Base flat. No pontil technique. True base ring, slightly outsplayed with faint slanting impressions on exterior. Thick coil of similar glass underneath rim, and another on shoulder.

Fabric 5.

III. *PUSHED-IN BASE*

## FOLDED RIM, INWARD

Four fragmentary bases occurred which are shown to belong to this type of flask by the analogy of a complete example from Wainwright's Karanis hoard.<sup>1</sup>

589. 24/136 D/X.

PL. XVIII

Green; base and part of body; no weathering; full of bubbles.

D. body 0.058 m. A.T. 0.001 m.

Body bulbous with vertical corrugations reaching over in part on to base ring. Pushed-in base ring, flat-sided, with tubular edge. Centre of base deeply convex.<sup>2</sup> No pontil technique.

Fabric 8.

590. 24/148 A/J Mich. 5865.

A fragment of base as no. 589, green. Fabric 8.

591. 24/4028 E/E Mich. 5866.

Fragment of another, as no. 590, yellowish glass with purple streaks. Fabric 4.

592. 24/4034 B/N Mich. 5441.

Fragment of another, as no. 590, green. Fabric 5.

<sup>1</sup> No. J 47101 b:

Green; intact. H. 0.115 m.

Rim outsplayed and folded upward and inward. Neck cylindrical with constriction at base. Ovoid body. Pushed-in base, exactly as no. 589. S-shaped corrugations from base of neck downward, reaching over in part to base ring.

Fabric 5.

<sup>2</sup> For this type of base compare a jug from Palestine in the Victoria and Albert Museum (Beck loan, no. 1004).

IV. *COIL BASE*  
 FOLDED RIM, INWARD

Only one example occurred.

**593.** 24/148 D/A Cairo J 49885.<sup>1</sup> PLS. VIII and XVIII  
 Greenish yellow, with green coils; crack in base; usage scratches, no weathering; fairly bubbly.

H. 0.265 m. G.D. 0.155 m. A.T. neck 0.0035 m.  
 Rim outsplayed at angle of 45° from neck and folded upward and inward. Neck cylindrical with constriction at base. Body inverted-piriform with well-marked concavity in upper part of sides. Base concave with pontil technique and pointed kick. Thick coils of similar glass on shoulder and on base. On body and base of neck a series of pinched ribs, vertically, in pairs, each pair converging toward each other in centre.<sup>2</sup>

Fabric 5.

**B. TALL-NECKED FLASKS WITH NO CONSTRICTION  
 AT BASE OF NECK**

The shape of the body in this group greatly varies, and ranges from globular to ovoid or squat bulbous.

I. *PLAIN BASE*

(a) FOLDED RIM, INWARD

I. *Plain*

The vases vary greatly in shape and size. Some of the smaller pieces should perhaps be classed under group C below, but owing to the difficulty of drawing a dividing line they have all been grouped together here. The following complete and fragmentary specimens were listed; smaller fragments also occurred.

**594.** 28/C 42 F/J Mich. 5957. PLS. VIII and XVIII  
 Greenish yellow; intact; contents stain and patches of milky iridescence; material very bad; full of bubbles; black extraneous matter on rim picked up by the glass when warm.

H. varies 0.073–0.077 m. G.D. 0.0048 m. A.T. 0.0013 m.  
 Rim outsplayed and folded upward and inward. Neck cylindrical; curved junction of neck and shoulder. Body globular. Base concave with pointed kick and pontil technique.

Fabric 4.

<sup>1</sup> A pointed wooden stopper was found in place in the mouth of the vase.

<sup>2</sup> For this type of decoration compare a jug in Mayence, Morin-Jean, fig. 128; an olla of Morin-Jean's form 5 in the museum at Vannes (Morin-Jean, p. 51, note 1); a jug from Syria in Lyons; and an olla from the Cimetière des Dunes, Poitiers, now in Poitiers.

595. 27/209 c/gr Cairo I 52762.<sup>1</sup>

Colourless with greyish tinge; intact; usage scratches, no weathering; very bubbly; some black impurities.

H. 0.062 m. G.D. 0.048 m. A.T. 0.001 m.

Shape as no. 594, but base concave without kick or pontil technique.

Fabric 3.

596. 24/4029 c<sup>1</sup>/o Mich. 5557.

PLS. VIII and XVIII

Green; intact; no weathering; very bubbly and full of black impurities.

H. 0.069 m. G.D. 0.056 m. A.T. 0.001 m.

Rim outsplayed and folded upward and inward, but only partially. Neck shortish with faint upward taper in sides; curved junction of neck and shoulder. Body globular. Base slightly concave, without pontil technique.

Fabric 4.

597. 25/293 A/E Mich. 5558.

Pale yellow; intact; no weathering; bubbly; blowing spirals noticeable.

H. 0.063 m. G.D. 0.046 m. A.T. 0.0015 m.

Shape similar to no. 596, but wider rim and shorter neck. Concave base with pointed kick and pontil technique.

Fabric 4.

598. 24/4030 F/E Mich. 5845.

PL. XVIII

Colourless; fragment of rim, neck, and shoulder; no weathering; bubbly.

H. of flask c. 0.06 m. A.T. 0.0007 m.

Rim folded inward and downward. Constriction in neck two-thirds of way down, from which the neck spreads upward to rim, and downward to shoulder. Sharply curved junction between neck and shoulder.

Late fabric 2.

599. 24/100 E/AI Mich. 5576.

PLS. VIII and XVIII<sup>2</sup>

Colourless with green tinge; part of rim missing; stained, no weathering; material bad; full of large bubbles.

H. 0.071 m. Maj. Ax. 0.043 m. Min. Ax. 0.03 m. A.T. 0.0015 m.

Rim slightly outsplayed and folded upward and inward. Neck cylindrical; curved junction of neck and shoulder. Globular body flattened on two sides, making the horizontal section of the vase oval. Base concave with pointed kick and pontil technique.

Late fabric 2 or fabric 3.

600. 26/BC 72 F/D Mich. 5956.

PLS. VIII and XVIII

Yellowish colourless; intact; traces of milky weathering; bubbly with some black impurities.

H. 0.081 m. G.D. 0.044 m. A.T. 0.0005 m.

Rim slightly outsplayed<sup>3</sup> and folded inward and downward. Neck cylindrical and very tall, with slight concavity in sides. Sharply curved junction of neck and body. Body globular. Base concave with deep, pointed kick; no pontil technique.

Fabric 3 or 4.

<sup>1</sup> This vase was found inside no. 509 (class VIII).

<sup>2</sup> The collotype plate shows the minor axis, the line drawing the major axis.

<sup>3</sup> There is a depression in the lip, which may be a rudimentary spout.

**601.** 27/B 121 K/G Mich. 5943. PLS. VIII and XVIII  
 Dark green; intact; dirty within, no weathering; bubbly with black impurities; blowing spirals noticeable.  
 H. 0.16 m. G.D. 0.13 m. A.T. 0.0015 m.  
 Funnel rim, well outsplayed, and folded inward and downward. Neck nearly cylindrical but broadening out toward base. Sharply curved junction of neck and shoulder. Squat bulbous body. Base concave with deep, pointed kick and pontil technique.  
 Fabric 5.

The following fragmentary specimens should also be noticed:

**602.** 28/BS 130/C.  
 Green; fragments of rim, neck, and body; no weathering; bubbly.  
 H. c. 0.20 m.  
 Rim outsplayed almost horizontally and folded upward and inward. Cylindrical neck, globular body, slightly concave base, no pontil technique.  
 Fabric 5.

**603.** 25/4016/Q Mich. 6060.  
 Greenish colourless; neck and rim missing, body complete; no weathering; very bubbly.  
 G.D. 0.06 m. A.T. 0.001 m.  
 Globular body, concave base without pontil technique.  
 Fabric 8.

**604.** 25/5056/F Mich. 6065.  
 Green; fragment of rim and neck; no weathering; very poor and bubbly.  
 H. of neck 0.04 m. A.T. 0.0015 m.  
 Rim outsplayed and partly folded inward. Neck cylindrical but crooked and uneven.  
 Fabric 8.

**605.** 26/B 2 AB/G Mich. 6083.  
 Base of flask, concave, without pontil technique. Purple. Fabric 6.

**606.** 27/C 57 H/C Mich. 6205.  
 Base of flask, concave, with pointed kick and pontil technique. Purple. Fabric 6.

**607.** 24/5012 F/I Mich. 5849.  
 Dark green; fragment of rim and neck; no weathering; bubbly.  
 H. of neck 0.05 m. A.T. 0.001 m.  
 Rim very roughly made and asymmetrical, with deep fold inward and downward, leaving a very narrow mouth. Neck cylindrical. Body probably globular.  
 Fabric 5.

## 2. *Corrugations on body*

The following complete and fragmentary specimens were listed; smaller fragments also occurred.

**608.** 24/X Mich. 5574. PLS. VIII and XVIII  
 Green; intact; incipient iridescence; many bubbles, few impurities.  
 H. 0.115 m. G.D. 0.102 m. A.T. 0.002 m.  
 Deep funnel rim, folded inward and downward. Short cylindrical neck. Stepped

shoulder. Squat bulbous body. Base concave without pontil technique. Twenty vertical corrugations on body from shoulder step to base.  
Fabric 5.

**609.** 27/C 50 A/M Cairo J 52757.

Brown; intact; no weathering; bubbly with black impurities; blowing spirals noticeable.

H. 0.142 m. G.D. 0.134 m. A.T. 0.002 m.

Funnel rim, well outsplayed, and folded inward and downward. Neck nearly cylindrical, but broadening out toward bottom. Gentle curve between neck and shoulder. Squat bulbous body. Base concave without pontil technique. Twenty-eight vertical corrugations on body from shoulder to base.

Fabric 5.

**610.** 27/B 118 J/E<sup>2</sup> Mich. 6164.

Brownish yellow; fragments of rim, neck, and base; no weathering; bubbly.

H. of neck 0.03 m. A.T. 0.001 m.

Rim outsplayed and folded upward and inward. Neck cylindrical with curved junction between it and shoulder. Body globular. Base concave without pontil technique. S-shaped corrugations on body from shoulder to base, number uncertain.

Fabric 5.

**611.** 27/C 45 A/G.

Yellowish green; in many fragments, nearly complete; dirty, frosted; bubbly.

H. c. 0.20 m. G.D. c. 0.13 m. A.T. 0.001 m.

Rim folded inward and downward. Neck funnel-shaped with slightly convex sides tapering from rim to base. Sharply curved junction of neck and shoulder. Globular body. Base concave without pontil technique. Thirty-two faint vertical corrugations on body.

Fabric 5.

### 3. *Corrugations on body, and coils*

The following example was listed; numerous smaller fragments also occurred.

**612.** 27/B 121 K/F Mich. 5944.

PLS. VIII and XVIII

Dark green; intact; no weathering; bubbly with black impurities; blowing spirals.

H. 0.215 m. G.D. 0.14 m. A.T. neck 0.002 m.

High funnel rim, folded inward and downward. Cylindrical neck meeting shoulder in gentle curve. Ovoid body with greatest diameter at shoulder and sides tapering strongly from there to base. Base concave without pontil technique. Thick horizontal coil of similar glass near base of neck. On body thirty-nine S-shaped corrugations from shoulder to base.

Fabric 5.

### 4. *Corrugations and thumb indents on body, and coils*

**613.** 25/5083 B/AI Mich. 5687.

Green with blue coil; in many fragments, incomplete; dirty, no weathering; bubbly; few impurities.

H. 0.17 m. G.D. 0.10 m. A.T. 0.002 m.

Shape as no. 612. Uncertain number of vertical corrugations, and on top of these a series of ten thumb indents.

Fabric 5.

5. *Coils*

The following fragments probably belong here, but in no case is enough of the vase preserved to give a complete restoration:

**614.** 25/314 H/B Mich. 6054.

Greenish colourless with bluish green coil; fragment of rim and neck; strain cracks, no weathering; bubbly.

H. of neck 0.077 m. A.T. 0.001 m.

Shape as no. 612, with coil at base of neck.

Fabric 3.

**615.** 27/C 59 A/H Mich. 6208.

Greenish colourless with similar coil; fragment of rim and neck; no weathering; bubbly.

H. of neck c. 0.04 m. A.T. 0.001 m.

Rim outsplayed and folded upward and inward. Neck cylindrical with coil at base.

Fabric 3.

**616.** 27/C 29 D/L Mich. 6171.

Olive green with dark green coil; fragment of rim and neck; no weathering; bubbly.

H. of neck 0.023 m. A.T. 0.001 m.

Shape as no. 615. Coil underneath rim.

Fabric 4.

**617.** 27/CA 72/S Mich. 6219.

Colourless with purple streaks, greenish coil; fragment of rim and neck; no weathering; bubbly.

H. of neck 0.03 m. A.T. 0.001 m.

Shape as no. 615. Coil underneath rim.

Fabric 3.

**618.** 24/4028 E/E Mich. 5866.

Pale green with bluish green coil; fragment of neck; frosted; bubbly.

D. neck 0.02 m. A.T. 0.001 m.

Part of neck and shoulder, shape as no. 615. Coil at base of neck.

Fabric 3.

**619.** 28/BS 160/NI Mich. 6231.

Similar fragment of neck, pale green with blue coil.

**620.** 28/BS 160/NI Mich. 6231.

Similar fragment of neck. Deep purple with light green coil.

**621.** 28/130\*/F.

Similar fragment of neck. Pale green with blue coil, the coil indented at intervals.

**622.** 27/C 41 A/L Mich. 6173.

PL. XVIII

Yellowish with bright green coil; fragment of rim and top of neck only; no weathering; bubbly.

From a large flask, D. lip 0.108 m. A.T. 0.0015 m.

Rim broad and outsplayed horizontally and folded upward and inward. Coil on under side of rim 0.01 m. from lip.

Fabric 4.

623. 26/BC 76 B/L Mich. 6148.

PL. XVIII

Purple with blue coil; fragment of rim and top of neck; frosted; bubbly. From a large flask, D. lip 0.092 m. A.T. 0.0015 m.

Rim broad and outspayed horizontally, and folded upward and inward. Coil on under side of rim, 0.005 m. from lip. Neck expands downward. Fabric 6.

624. 25/5084 A/D Mich. 6071.

Greenish colourless, bright blue coil; fragment of rim; frosted; bubbly.

Shape and dimensions as no. 623.

Fabric 3.

625. 28/C 47 B/E.

Green with similar coil; fragment of rim and part of neck; no weathering; bubbly. From a large flask.

Rim slightly outspayed and folded upward and inward. Spiral thread on neck, probably reaching from lip to base of neck.

Fabric 5.

626. 28/B 128 B/E.

Similar fragment of neck with spiral coil. Buff colourless with similar coil. Fabric 3.

#### 6. *Raised ribs on body*

The following fragmentary specimen probably belongs here. Its complete shape is uncertain, but enough of the rim is preserved to show that it was folded.

627. 26/B 21 P/B Mich. 6116.

PL. XVIII

Colourless with greenish tinge; fragments of rim, neck, and shoulder; dulled, no weathering; very bubbly.

H. of neck 0.045 m. A.T. 0.0008 m.

Rim outspayed and folded upward and inward. Neck cylindrical with sharply curved junction between neck and shoulder. Body bulbous with vertical raised ribs.

Late fabric 2.

#### 7. *Mould-blown decoration*

One complete and one almost complete example occurred. The base fragments which follow probably belong to flasks of the same type. The list includes all the fragments of mould-blown flasks that have been found.

628. 26/X Cairo J 51406.

PLS. VIII and XVIII

Dark green; intact; patch of iridescence on body; very bubbly.

H. 0.092 m. G.D. 0.048 m. A.T. neck 0.0015 m.

Rim outspayed horizontally and folded upward and inward. Neck cylindrical. Curved junction of neck and shoulder. Body bulbous. Base thick and flat. Body and base blown into a bipartite mould, which has left marks on the base and sides. Decoration of a knobbed-honeycomb pattern, uniform all over the body.<sup>1</sup>

Fabric 5.

<sup>1</sup> Compare for this decoration, Kisa, fig. 311 (from Cologne), and Niessen Cat., no. 1056, pls. xxxvii and lii (from Syria).

629. 27/C 45 J/BI Mich. 6181.

PL. XVIII

Green; fragments of neck, body, and base, lip missing; no weathering; bubbly with black impurities.

H. c. 0.085 m. G. D. 0.048 m. A.T. 0.0008 m.  
 Rim as no. 628. Neck cylindrical with curved junction of neck and shoulder. Body bulbous, base flat. Body and base blown into a bipartite mould which has left marks on base and sides. Pattern on the body consisting of two male masks back to back with a grape-cluster on each side between them. On the base a simplified XP monogram (P) moulded in relief, perhaps a maker's mark.<sup>1</sup>

Fabric 5.

630. 26/B 24 L/P Mich. 6118.

PL. XVIII

26/B 3 O/C Mich. 6088.

Two bases, identical and perhaps from the same mould.

Green; no weathering; very bubbly.

D. base 0.044 m. A.T. 0.001 m.

Base and fragment of side, blown into tripartite mould. Base flat, sides vertical at first, and then spreading out into bulb where the pattern begins. Honeycomb pattern of horizontal rows of hexagonal hollows in quincunx formation. Twenty-six hollows in the bottom row on each fragment.

Fabric 8.

631. 24/101 F/E Mich. 5485.

Another base as no. 630, greenish. Fabric 8.

632. 24/5020 A/O Mich. 5805.

PL. XVIII

Yellowish colourless; fragment of base; no weathering; bubbly.

D. base 0.045 m. A.T. 0.003 m.

Base of mould-blown flask. On it an irregular geometrical pattern of curved lines. On the side traces of a honeycomb pattern of lozenge-shaped hollows with a bottom row of irregular pentagons.

Fabric 3.

633. 26/B 56 D/A Mich. 6141.

PL. XVIII

Green; fragment of base and bottom of sides; frosted; very bubbly.

G.D. c. 0.045 m. A.T. base 0.004 m. A.T. side 0.001 m.

Thick, slightly concave base with pontil technique. Sides spread out to bulbous body from top of base. Body blown into a mould with pattern of closely set, S-shaped ribs.

Fabric 8.

634. 28/B 152 B/RI Mich. 6230.

Base as no. 633, dark green with milky weathering. Fabric 5.

<sup>1</sup> Compare Morin-Jean, p. 193: 'On connaît de la fin du iv<sup>e</sup> siècle ou des premières années du v<sup>e</sup> des verres moulés ornés du monogramme du Christ.' In a letter, M. Morin-Jean has been good enough to give further information on the two pieces specially referred to. The one, in a private collection in St. Quentin, was lost during the European war. The other was in an Italian museum. Both had as monograms P and not P, and were probably of western origin. A base of a vase of yellowish glass in the museum at Aquileia bears a reversed P symbol (presumably stamped or mould-blown); see E. Maionica, *Archeographo Triestino*, xv, 294. There is a glass sealing from a bottle in the British and Mediaeval Department of the British Museum bearing a P symbol in relief within a pearl border: it comes from Alexandria; Dalton, *Cat. Early Christ. Antiq. in B.M.*, p. 138, no. 710.

## (b) ROUNDED RIM

Only one fragmentary undecorated specimen occurred. With it are grouped two fragments of necks with rounded rims, but they may not have belonged to flasks with plain bases.

635. 27/c 41 c/p Mich. 6175.

PL. XVIII

Dark blue with some purple streaks; fragment of rim, neck, and shoulder and a base fragment; no weathering; bubbly.

H. c. 0.09 m. A.T. 0.0008 m.

Rim rounded. Funnel neck with faintly concave sides tapering downward. Curved junction of neck and shoulder. Body bulbous. Base concave without pontil technique.

Fabric 7.

636. 24/5048/AQ Mich. 5827.

PL. XVIII

Colourless with greyish tinge; fragment of rim, neck, and shoulder; frosted and iridescent; material fair.

H. neck 0.02 m. A.T. 0.001 m.

Rim outsplayed and rounded. Shortish cylindrical neck, joining shoulder in gentle curve. Body bulbous (?). No decoration.

Fabric 2.

637. 27/c 6 c/d Mich. 6166.

PL. XVIII

Colourless with greenish tinge; fragment of rim and neck; milky weathering; pin-prick bubbles.

H. neck 0.06 m. A.T. 0.0025 m.

Rim outsplayed and rounded. Neck cylindrical, broadening out at bottom to join shoulder in gentle curve. Thin horizontal thread of similar glass at top of neck.<sup>1</sup>

Fabric 2.

## II. COIL BASE

## (a) ROUNDED RIM

Two fragmentary specimens occurred, one with traces of horizontal wheel incisions on body, the other a neck fragment only.

638. 27/c 65 c/a Mich. 6212.

PL. XVIII

Olive greenish, with dark green coil; fragments of neck, base complete; no weathering; bubbly.

G.D. 0.06 m. A.T. 0.001 m.

Rim rounded.<sup>2</sup> Funnel neck with concave sides tapering downward. Curved junction of neck and shoulder. Bulbous body. Thick base, convex above, flat below, with pontil technique. Thin base coil of dark green glass.

Fabric 4.

<sup>1</sup> Two eastern parallels to this fragment exist. One is a vase of the same fabric decorated with wheel incisions which was found at Idalium by Cesnola and is now in the British Museum (Fig. 4, c, and Cesnola, *Cyprus*, pl. iii); the other is a flask found at Oxyrhynchus and listed by Edgar (Cat., no. 32754, pl. x). It is of fabric 1 and plain save for coils at the base of the neck and near the bottom of the body. The base ring is tubular. All these probably came from the same workshops, those of Alexandria. Similar necks are common on flasks of snake-thread ware in the west, e.g., Kisa, figs. 114-15.

<sup>2</sup> The pontil mark on the base suggests that this was so.

## (b) UNWORKED RIM

The following fragmentary examples should be grouped here. Some unlisted fragments with unworked rims also occurred.

## 1. Plain

**639.** 28/c 88 c/L Mich. 6238.

Colourless with yellowish tinge; rim, neck, and shoulder; frosted; pin-prick bubbles. H. neck 0.04 m. A.T. 0.0015 m.

Unworked rim. Funnel neck with slightly concave sides tapering downward to sharp angular junction with shoulder. Body probably bulbous.

Fabric 2.

**640.** 24/5024 D/AI Mich. 5857.

Green; fragment of rim and neck; dirty, no weathering; very bubbly and many black impurities.

H. neck 0.085 m. A.T. 0.0015 m.

Unworked rim. Funnel neck with concave sides tapering downward to curved junction with shoulder. No evidence of shape of body.

Fabric 5.

2. *Coil at base of neck, corrugations on body*

**641.** 25/4017 D/B Mich. 6061.

PL. XVIII

Buff colourless with greenish colourless coils; many fragments including neck, base, and part of body; dirty, no weathering; material bad and bubbly.

H. c. 0.13 m. G.D. c. 0.095 m. A.T. neck 0.0018 m. A.T. body 0.0005 m.

Unworked rim. Neck funnel-shaped with concave sides tapering downward to curved junction with shoulder. Bulbous body with a series of S-shaped corrugations running from shoulder to base. Convex base. Coil at base of neck, and a base coil, both of greenish colourless glass.

Fabric 3.

**642.** 25/268 A/A Mich. 6045.

Colourless with yellowish tinge, greenish coil; numerous fragments of neck, body, and base; no weathering; many pin-prick bubbles.

Dimensions roughly as no. 641. A.T. 0.0005 m.

Shape as no. 641.

Fabric 3.

**643.** 28/B 132 A/E.

Dark yellow; in fragments, nearly complete; no weathering; bubbly.

H. c. 0.20 m. A.T. 0.0015 m.

Shape and decoration as no. 641, but base concave.

Fabric 5.

**644.** 26/BS 1/J Mich. 6149.<sup>1</sup>

PL. XIX

Buff colourless with greenish coil; fragment of rim and neck; frosted; bubbly.

H. neck 0.075 m. A.T. 0.002 m.

Shape as no. 641. Body probably bulbous.

Fabric 3.

<sup>1</sup> This and the next two examples are insufficiently preserved to show whether they had body corrugations.

645. 27/C 29 B/K Mich. 6169.

Fragment of neck, as no. 641. Purple with green coil. No weathering. Fabric 6.

646. 27/C 57 J/F Mich. 6207.

Fragment of neck as no. 641. Yellowish colourless with green coil. Spots of milky-pitting weathering. Fabric 4.

(c) FRAGMENTARY COIL BASES

In addition to the above many broken coil bases occurred which probably belonged to flasks of this type.<sup>1</sup> The following combinations of colours were found. Unless otherwise mentioned, each flask, so far as the extant fragment showed, was plain.

1. *Greenish colourless flask with similar coil*

647. 28/C 121 G/C Mich. 6241.

2. *Green flask with similar coil*

648. 28/C 88 C/L Mich. 6238.

649. 24/106 E/L Mich. 5377. Ribbed body, thick base coil.

650. 24/4031/F Mich. 5478. Ribbed body, thick base coil.

651. 26/B 27 G/M Mich. 6127.

3. *Greenish colourless flask with bluish green coil*

652. 24/5048/AQ Mich. 5827 (two examples).

4. *Yellowish colourless flask with blue coil*

653. 28/157\*/K (two examples).

654. 28/B 167 A/R Mich. 6232.

5. *Yellowish colourless flask with bluish green coil*

655. 28/C 49 J<sup>1</sup>/O.

6. *Yellow flask with light green coil*

656. 28/C 88 C/L Mich. 6238.

657. 25/5058 A/C Mich. 6066.

658. 24/132 D/N Mich. 5427. Solid multiple coil, well outsplayed.

PL. XIX

7. *Yellow flask with dark green coil*

659. 27/241 C/Q Mich. 6155.

660. 27/CS 60/L Mich. 6221.

<sup>1</sup> Some of these perhaps belong to jugs (class XI A) or to two-handled flasks (class XII).

8. *Yellow flask with bluish green coil*

661. 28/c 121 G/c Mich. 6241.

9. *Yellow flask with blue coil*

662. 28/c 59 K/F. S-shaped corrugations on body.

10. *Yellow flask with deep purple coil*

663. 28/c 121 G/c Mich. 6241.

11. *Pale purple flask with pale green coil*

664. 26/B 17 F/N Mich. 6112.

665. 28/BS 160/NI Mich. 6231.

666. 24/4006/c Mich. 5753. Solid multiple coil, well outspread.

12. *Pale purple flask with opaque turquoise blue coil*

667. 28/157\*/K.

13. *Pale purple flask with blue coil*

668. 28/BS 160/NI Mich. 6231.

14. *Purple flask with opaque jade green coil*

669. 28/c 102 J/G.

15. *Purple flask with green coil*

670. 25/4016/Q Mich. 6060. Ribs on body.

671. 25/280 A/A Mich. 6050.

## C. MISCELLANEOUS BASE FRAGMENTS

I. *BASE RING*

The three following fragments of base rings occurred, besides those mentioned under A ii above:

672. 24/121 E/M Mich. 5374.

PL. XIX

Dark green; base complete, and lower part of body; no weathering; very bubbly.  
D. body 0.082 m. A.T. 0.0015 m.

Body bulbous (?) with carination near base. Pad base, with faint slanting impressions and a slightly scalloped edge on ring. Base flat. Post technique.  
Fabric 5.

673. 27/c 64 C/D Mich. 6211.

Green; base complete, and part of body; slight patches of iridescence; bubbly.  
D. base ring 0.053 m. A.T. body 0.001 m.

Body bulbous. True base ring, almost vertical, with no slanting impressions. Base convex. Post technique.  
Fabric 5.

**674.** 27/c 56 E/W Mich. 6199.

Dark blue; base complete, and part of body; no weathering; bubbly.

D. base ring 0.038 m. A.T. body 0.0005 m.

Body bulbous. Pad base with no slanting impressions on ring. Base concave with slight kick and pontil technique.

Fabric 7.

## II. PUSHED-IN BASE

The following examples of bases of this technique occurred, which may belong to flasks:

**675.** 26/B 4 L/D Mich. 6093.

Green; base and part of body; slight iridescence; very bubbly.

D. base ring 0.051 m. A.T. body 0.01 m.

Body bulbous. Tubular, pushed-in base ring, almost horizontal. Base concave and thick in centre. Pontil technique.

Fabric 8.

**676.** 25/262/Q Mich. 6044.

PL. XIX

Dark blue; fragment of base only; iridescent pitting; material good.

D. base ring 0.055 m. A.T. 0.002 m.

Body bulbous with traces of a decoration of thin horizontal wheel cuts.<sup>1</sup> Base pressed flat immediately below a cut-in at bottom of sides, thus forming a pushed-in base of unusual shape.

Fabric 7, of very fine workmanship.<sup>2</sup>

## III. SOLID BASE

The following solid base with vertical sides occurred:

**677.** 27/c 45 N/O Mich. 6183.

PL. XIX

Yellow; base and part of body; no weathering; bubbly.

G.D. body 0.042 m. A.T. body 0.001 m. A.T. base 0.006 m.

Body bulbous. Base thick and solid with vertical sides, blown with body and pressed flat below. Pontil technique.

Fabric 4.

## IV. BASES ON PINCHED TOES<sup>3</sup>

The following bases of vases with pinched toes occurred, probably all from flasks:

### (a) THREE TOES

**678.** 27/242 B/D Mich. 6156.

PL. XIX

Green; base only; no weathering; bubbly.

W. across toes 0.025 m.

Base of bulbous flask (?) with three twisted and interwoven toes pinched out from body.

Fabric 5.

<sup>1</sup> On the extant fragment there are two close together.

<sup>2</sup> The piece can hardly be dated later than the second century and must be a survival in this late house.

<sup>3</sup> Bases with pinched toes have already been met with under VIII B iii, p. 182 above. Similar types are not unknown elsewhere during the Roman period. Amongst examples

## (b) FOUR TOES

**679.** 24/4037 B/C Mich. 5873.  
 Greenish colourless; base only; no weathering; very bubbly.  
 D. across toes 0.031 m.  
 Base of bulbous flask (?) with four toes pinched out from bottom of body. Pontil  
 technique in centre of base below.  
 Fabric 8.

**680.** 28/216\* C.  
 Base as no. 679, colourless. Fabric 2.

## (c) FIVE TOES

**681.** 27/B 118 A/J Mich. 6162. PL. XIX  
 Greenish; base only; no weathering; very bubbly.  
 D. across toes 0.035 m.  
 Base as no. 679, but five toes.  
 Fabric 8.

## (d) RING OF SMALL TOES

**682.** 24/5006 A/AA Mich. 5841. PL. XIX  
 Greenish colourless; base only; no weathering; bubbly.  
 D. across toes 0.042 m.  
 Bulbous body, base flat with no pontil technique. On base, a ring of about twenty  
 small pinched toes.  
 Fabric 3.

**683.** 25/245/D Mich. 6037.  
 Base as no. 682, buff colourless. Fabric 1.

**684.** 28/C 88 C/L Mich. 6238.  
 Another as no. 682, greenish colourless. Fabric 3.

**685.** 28/C 49 J<sup>1</sup>/O.  
 28/CS 90/F.  
 Two more as no. 682, olive green. Fabric 4.

may be mentioned two small flasks with constriction at the base of the neck and inverted-piriform bodies, one in Philadelphia (no. 5586, case XIV, no. 29) and another in Toronto (a fragmentary specimen, no. G 3889, from the Fayûm). Each has three pinched toes. A similar flask, inverted-piriform, yellow, is also in Toronto, no. G 1940. A group of flask bases with a ring of small toes found near Wiesbaden is mentioned by Kisa, pp. 13, 331, and 795, and a complete example of a similar type is illustrated *ibid.*, fig. 319 (form B 81), from the Zettler collection (probably, therefore, from Syria; see *ibid.*, p. 98 and note 1). A fragment of a flask with a ring of small toes, of Byzantine or early Arab date was recently found by an Oxford Expedition at Hira, Irak (now in Oxford, no. 1932.1241); and small flasks with three or four pinched toes have turned up in Sassanian levels at Kish (now in Oxford; Langdon and Harden, 'Excavations at Kish,' *Iraq*, i, 131 ff.).

## CLASS X

### BOTTLE-FLASKS WITHOUT HANDLES

**I**N class X are grouped all flask-shaped vases which have more elongated bodies than those of class IX, but have no handles and so are distinct from the one-handled and two-handled flasks of classes XI and XII. The class is a small one, and not very homogeneous. The few complete specimens that have been found vary considerably in general type, while amongst fragments only a very few—chiefly bases—can be assigned to the class with any confidence.<sup>1</sup>

For convenience of reference, a subdivision has been made on the same principles as those which governed the subdivision of class IX, but as the class is so small and the types comprising it are so various, it is likely that further discoveries will necessitate a certain amount of rearrangement.

The two vases listed under A are closely parallel in shape to the inverted-piriform flasks, class IX A, being only distinguished from them by a more angular form of body. They are not large and were perhaps unguent-vases. Each belongs to fabric 3, 4, or 5 and should be dated to the fourth or fifth century. One was found in a top-layer house, and the other is a surface find of uncertain provenance.

Five instances<sup>2</sup> of the same type, all undecorated, can be quoted from other sites in Egypt. It does not seem to occur in other provinces.

In group B three distinct types occur: the large plain bottle-flasks, i 1, with thinly blown body and rounded base, which were undoubtedly wine-flasks; the smaller unguent-bottles, i 1 and 2, with or without thumb indents; and the cylindrical bottle-flasks, ii-iv, with varying decoration and base technique, which were containers for liquids during transport or at table. These B vases mostly belong to fabric 3, 4, or 5, and come from houses in the upper levels. They are not earlier than the fourth century. One or two specimens, chiefly small unguent-bottles, belong to fabric 8 or to fabric 1 or 2 and may be earlier.

There are numerous examples from other Egyptian sites. Some

<sup>1</sup> Some of these fragments are just as likely to belong to handled jugs of class XI.

<sup>2</sup> Edgar, *Cat.*, nos. 32713 (from Hawara) and 32756 (from Fag-el-Gamus); Boston, nos. 02.816 (from Oxyrhynchus) and 04.1932 (from Abydos); and a small piece in Toronto, of dark blue glass.

are identical in form with one or other of the Karanis pieces and need no further description,<sup>1</sup> others vary in one or more respects. Several vases belonging to division i taper more sharply to a point than any of the Karanis examples: some of these are round in section down to the butt,<sup>2</sup> others are flattened on four sides to a pyramidal shape on the lower part of their body.<sup>3</sup> It is probable from the cir-

<sup>1</sup> The following is a list of those noted:

**B i 1** (type of 24/20/c):

Edgar, *Cat.*, nos. 32774-7 (from Armant).

Cairo, J 45766 (with wicker-work container, Fig. 4, d) and 46477; see App., p. 315.

Petrie, *Hyksos*, p. 40, pl. xxxvii B, grave 630.

(with knobbed base):

Edgar, *Cat.*, no. 32773 (from Armant).

Egyptian Museum, Berlin, 10197 (with wicker-work container).

**B i 2** (type of 24/136 M/T):

Edgar, *Cat.*, nos. 32714 (but with slightly flattened base) and 32715 (but with coil on neck).

Kaiser Friedrich Museum, Coptic Section, one example, not listed by Wulff.

(vertical corrugations or pinched ribs instead of thumb indents):

Askren collection, Mich. 5274 and 5281; see App., p. 326.

Victoria and Albert Museum, no. 1912.1897 (from Oxyrhynchus).

Toronto, G 2651.

**B ii 1** (type of 27/c 56 G/EI):

Edgar, *Cat.*, no. 32708.

Cairo, J 47116a; Wainwright, *Annales*, xxv, 102-4.

Askren collection, Mich. 5272-3; see App., p. 326.

Philadelphia, case xv, no. 132 (but with cut-out below rim).

**B ii 2** (type of 28/c 42 D/EI):

Edgar, *Cat.*, nos. 32705-7 (all from the Fayûm).

<sup>2</sup> The following plain examples:

Edgar, *Cat.*, no. 32704.

Askren collection, Mich. 5279; see App., p. 325.

Metropolitan Museum, Egyptian Department, 35.

Boston, 03. 1851 (from Oxyrhynchus).

Petrie, *Hawara*, p. 12, pl. xx, 1.

The following with spiral threads on neck:

Petrie, *ibid.*, p. 12, pl. xviii, 1.

<sup>3</sup> The following plain examples:

Edgar, *Cat.*, no. 32712 (from Hawara).

Askren collection, Mich. 5280; see App., p. 325.

Toronto, G 1016-7.

Philadelphia, case xiv, no. 25.

Kaiser Friedrich Museum, Coptic Section, Wulff, no. 1212.

The following with marvered-in threads:

Toronto, G 1882 and two others.

Brunton, *Qau and Badari*, iii, pl. xlvi, 24 (from Badari).

Petrie, *Hyksos*, p. 19, pl. xxi A.

cumstances of finding of some of these pieces that they, and more particularly the specimens with marvered-in threads, are of later date than the fifth century. This would explain their non-occurrence at Karanis. One freak type occurs in Edgar (no. 32760, from Fag-el-Gamus) which has a carinated body, concave-sided above and conical below. It is of purple glass, with a green coil on the neck.

In regard to vases with concave bases, division ii, some new types of decoration should be mentioned. In Boston there is a specimen with a rim coil (no. 05. 276, from Oxyrhynchus) and another is published by Brunton from Badari.<sup>1</sup> In the Petrie collection in University College, London, is an example from Hawara of purple glass with a spiral coil of blue on rim and neck, while Edgar lists two pieces (nos. 32702-3) which are of colourless glass with blue rim coils and have also rows of horizontal wheel incisions on the body. A third vase in Cairo (Edgar no. 32772, from Armant) is of a new type altogether, for it has flattened sides, like the rectangular bottles XI c, and a spiral coil at the rim. It is tall (0.25 m. high), and of light green glass.

Finally two vases in Cairo belong to this group, but are quite distinct in shape from any of the foregoing. The first, no. 32701 in Edgar's catalogue, is of greenish colourless glass. It has a tall cylindrical neck with funnel rim, folded inward: the body is ovoid and stands on a small, stemmed base ring, formed by twisting and having slanting impressions on the ring. At the base of the neck is a coil of similar glass. The vase is akin in shape to the jugs of XI A, but as it is handleless it must be classed here. The second, no. J 45767 in Cairo (Fig. 4, e; see App., p. 315), is curious. It was sent to the Museum with a group of other vases, chiefly flasks and jugs of fabric 4 or 5, as having been found at Karanis by *sebbakh*-diggers in 1916, so that its provenance and Roman date seem well attested. Of greenish colourless glass, it has an unworked rim, a tall, concave neck, and a carinated body, and stands on a high, outsplayed base ring of the pushed-in type.<sup>2</sup> The decoration is very remarkable. All over the interior and on the under side of the base are strips of gold-leaf held in place by a backing of bitumen,<sup>3</sup> while the exterior surface is mottled with white paint.

<sup>1</sup> Brunton, *Qau and Badari*, iii, pl. xl ix, 6.

<sup>2</sup> For a similar base compare the fragment, no. 489, class VII.

<sup>3</sup> Was this interior decoration applied before or after the vase was blown?

All these shapes occur outside Egypt, some in both eastern and western provinces, others in eastern provinces only.

Examples of bottle-flasks with cylindrical body and rounded base do not seem to occur in the west, but there is an eastern example in the British Museum of yellowish glass from Athens (bought in 1894), and another presumably eastern example—it has purple iridescence—is in the Gréau collection in the Metropolitan Museum.<sup>1</sup> The type with thumb indents is common in both the west and the east.<sup>2</sup> The parallel type to these, in which the body tapers to a pointed base, is listed by Morin-Jean (forms 27 and 30) and Kisa (forms A 52-3). Some specimens which have shortish necks (Morin-Jean 27 and Kisa A 52-3) are made in fine wares of first-century date,<sup>3</sup> and these prove the date of coarser examples of the same kind;<sup>4</sup> in the later centuries of the Empire the neck became longer (Morin-Jean's form 30).<sup>5</sup> The type with body tapering to a pyramidal butt does not occur in the west but is common in Syria<sup>6</sup> as well as in Egypt. This is an additional reason for assigning it to a later date than the fifth century, for had it arisen before then it should have migrated westwards along with other late Roman types.

Bottle-flasks belonging to division ii (i.e., with flat or concave bases) are also common. Of western types Morin-Jean lists four distinct forms, nos. 10, 12, 19, and 66, none of which is directly parallel to anything yet found at Karanis. Form 10 (p. 56, fig. 32) is a tall cylindrical bottle for unguents of a type which more often has two small dolphin handles at the base of the neck<sup>7</sup> (see class XII, p. 254 below). Forms 12 (p. 59, fig. 35) and 66 (p. 121, fig. 149) are two shapes that are not always distinguishable one from the other; the

<sup>1</sup> Froehner, *Gréau Cat.*, no. 1447, pl. ccclvi, 4.

<sup>2</sup> An example from Syria is in Oxford (no. 1912.131) and others, from Phoenicia, are in the Gréau collection, Froehner, *Gréau Cat.*, no. 1204, pl. ccxviii, 6, and no. 1500, pl. clxiii, 1. For examples from the west see Morin-Jean, form 28, p. 80, fig. 257; Niessen *Cat.*, nos. 240-2, 245-9, pl. xlvi, and 252, pl. xxxix (with very short neck). The type lasted long. Early examples (first-second century) are in Cologne, and a late piece, found with a bowl of imitation Samian ware (i.e., fourth-fifth century), is in St. Germain, from Crayère de Crozard, Marne.

<sup>3</sup> E.g., an example in flashed glass, Kisa, fig. 192, and one in marbled glass, *ibid.*, pl. ii, 3.

<sup>4</sup> E.g., Fremersdorf, *Denkmäler*, pl. i; Niessen *Cat.*, pl. iv (no. 523); and Morin-Jean, fig. 331, 1 (grave-group from Trèves).

<sup>5</sup> See Morin-Jean, p. 80, fig. 81, for a specimen found in a grave with a coin of Constans; and for eastern examples, Cesnola, *Atlas*, iii, pl. cv, 6 and 8 (from Idalium).

<sup>6</sup> See, e.g., Lamm, *Mittelalt. Gläser*, pls. xxxii, 5-7, and xlvii, 1-4, who dates the form to the seventh-eighth century.

<sup>7</sup> See also Fremersdorf, *Röm. Gläser*, pl. xxiv.

latter is probably a development of the former. They are prevalent in fourth-century to sixth-century graves in the west.<sup>1</sup> Form 12 is also found as a jug with one handle. Form 19 (p. 66, figs. 59–63) is the well-known 'Mercury'-flask, a four-sided bottle without handles blown into a mould and often bearing a maker's stamp on the bottom. No indubitable instance of this type can be quoted from Egypt, though Kisa states, without giving documentary proof, that it was very frequent there in graves of the early Imperial period:<sup>2</sup> it is just possible that unrecognized fragments exist among the numerous pieces of dark green four-sided bottles from Karanis. It is rare elsewhere in the east,<sup>3</sup> but is extremely common in second-century to fourth-century graves in the west.<sup>4</sup>

Another type occurs in the west which is more akin in shape to the Karanis pieces of division ii 1. In Morin-Jean's list it is mentioned as a very common variant of the same shape with one or two handles (form 9). As specimens may be mentioned the bottles from Boulogne and Nampteuil-sous-Muret, Aisne,<sup>5</sup> and numerous similar examples in St. Germain, all of which are plain except for a rim coil; others in the Niessen collection with a cut-out below the rim;<sup>6</sup> and a bottle in Cologne (no. 949) which bears scratched decoration just like that of the equivalent one-handled and two-handled bottles (pp. 236 and 256 f. below).

These division ii types are also common in Syria.<sup>7</sup>

No other bottles with coil bases or with bases on pinched toes are known.

The rare vase listed under C is a very fine specimen of fabric I and despite the fact that it was found in a top-layer house, its manufacture must be dated *c.* 200 at latest. It was, unfortunately, badly broken when found, and after restoration a few small fragments were discovered to be missing, but even in its imperfect state it is

<sup>1</sup> For other examples see Fremersdorf, *Denkmäler*, pl. xlvi: Niessen *Cat.*, pls. iv, no. 454; xlvi, no. 1101; xlvi, nos. 453–4; and liv, nos. 1102–3: and, for an example decorated with marvered-in threads, Morin-Jean, fig. 270.

<sup>2</sup> Kisa, pp. 782–3.

<sup>3</sup> There are two examples in Cesnola, *Atlas*, iii, pl. cv, 3, from Idalium.

<sup>4</sup> Kisa, figs. 65–6, forms B 105–7; Niessen *Cat.*, nos. 380–6, pl. xxxii.

<sup>5</sup> Morin-Jean, figs. 29 and 343. For a discussion of the type see *ibid.*, pp. 55–6.

<sup>6</sup> Niessen *Cat.*, nos. 448–52, pls. xxxii and xxxv.

<sup>7</sup> See, e.g., Victoria and Albert Museum no. C 39. 1927 (Lord Howard de Walden collection), and two in the British Museum, one from Syria (Durighello collection, 1913, wine-coloured), and one from Sidon (bought in 1879, colourless with greenish tinge). Of the type with corrugations there is a specimen in Froehner, *Gréau Cat.*, no. 1151, pl. ccviii, 8 (probably from Syria), and others exist in museums.

a testimony to the technical skill of the Romano-Egyptian glass-worker.

No vase quite like it is known either from Egypt or from another province.

#### SKELETON CLASSIFICATION

- A. Tall neck with constriction at base; body cylindrical below, conical above
- B. Tall neck and cylindrical or tapering body
  - I. Rounded or pointed base
    - 1. Plain
    - 2. With thumb indents, vertical corrugations, or pinched ribs
  - II. Flat or concave base
    - 1. Plain
    - 2. With corrugations on body
  - III. Coil base
  - IV. Base with pinched knobs
- C. Short neck, ovoid body

#### *A. TALL NECK WITH CONSTRICTION AT BASE; BODY CYLINDRICAL BELOW, CONICAL ABOVE*

Only two complete examples are known, both with plain bases. If fragments of others occurred, they were indistinguishable from fragments of flasks of class IX A.

**686. 24/148 F/L** Mich. 5580.

PLS. IX and XIX

Yellow; intact; brown contents stain within, no weathering; bubbly; no impurities. H. 0.168 m. D. body 0.034 m. A.T. 0.002 m.

Rim slightly outplayed and folded upward and inward. Neck cylindrical with constriction at base. Upper part of body conical, lower part cylindrical. Base flat. Fabric 5.

**687. 27/SG/E** Mich. 5959.

Pale olive green; chipped on rim; some spots of milky weathering; bubbly.

H. 0.094 m. D. body 0.047 m. A.T. 0.001 m.

Shape as no. 686, but broader and squatter body. Neck not very symmetrical.

Slight kick in base.

Fabric 3 or 8.

#### *B. TALL NECK AND CYLINDRICAL OR TAPERING BODY*

##### *I. ROUNDED OR POINTED BASE*

The bases vary from thinly blown and nicely rounded examples to solid and more or less pointed ones. The following complete and fragmentary examples were listed; smaller fragments were not uncommon.

1. *Plain*

**688.** 24/20/c<sup>1</sup> Mich. 5577.<sup>1</sup> PLS. IX and XIX  
 Green; one crack in body; stained, no weathering; bubbly, with some black impurities.

H. 0.255 m. D. body 0.06 m. A.T. 0.001 m.  
 Rim outsplayed, and folded upward and inward. Neck cylindrical. Curved junction of neck and shoulder. Shoulder horizontal. Body cylindrical. Roll in the glass at junction of shoulder and sides. Base rounded.

Fabric 8.

**689.** 24/20/c<sup>2</sup> Mich. 5578.  
 A duplicate of no. 688, in many fragments; patches of milky weathering.

**690.** 25/293 A/G Mich. 5579. PLS. IX and XIX  
 Yellow; intact; no weathering; bubbly.  
 H. 0.186 m. D. body 0.04 m. A.T. 0.001 m.  
 Rim and neck as no. 688. Shoulder sloping. Body more elliptical. Base solid-pointed. Pontil technique.

Fabric 4.

**691.** 25/237 F/G Mich. 6032.  
 Greenish; fragment of base only; dulled, no weathering; some bubbles.  
 D. c. 0.05 m. Thick glass.  
 A pointed, obtuse-angled base of a vase as nos. 688 ff. (?).<sup>2</sup>  
 Fabric 3 (?).

2. *With thumb indents, vertical corrugations, or pinched ribs*

All the present examples have thumb indents.

**692.** 24/136 M/T Mich. 5581. PLS. IX and XIX  
 Green; intact; much brown contents stain, no weathering; very bubbly.  
 H. 0.091 m. D. rim 0.023 m. A.T. 0.0005 m.  
 Shape as no. 690. On body five vertical thumb indents, set irregularly. Pontil technique with part of pontil wad remaining.  
 Fabric 8 (?).

**693.** 24/136 M/I Mich. 5621.  
 Six fragments of another, as no. 692.

**694.** 27/C 51 J/21 Mich. 6188.  
 Colourless with green tinge; fragment of neck and fragment of base; brown contents residue, milky iridescence; material fair.  
 H. c. 0.10 m. G.D. c. 0.03 m. A.T. 0.0005 m.  
 Neck and rim as no. 690. Greatest diameter at shoulder with slight concavity in sides below. Traces of four vertical thumb indents.  
 Fabric 2 (?).

**695.** 28/C 49 J<sup>1</sup>/O.  
 A base fragment, as no. 692.

<sup>1</sup> This and the next example when found were contained in wicker-work covers for protection during transport.

<sup>2</sup> Perhaps this is a fragmentary lid and not a base of a vase.

II. *FLAT OR CONCAVE BASE*

The bases on these examples have been pressed to a flat or a concave outline. All known fragments are listed.

1. *Plain*

**696.** 27/C 56 G/EI Mich. 5958. PL. IX and XIX  
Yellowish green; in many fragments, almost complete; stains, no weathering; bubbly with some black impurities.

H. 0.085 m. D. body 0.05 m. A.T. 0.0008 m.  
Rim outsplayed and folded upward and inward. Neck cylindrical, meeting shoulder in gentle curve. Shoulder sloping. Body short and cylindrical. Base concave with slight kick.

Fabric 5.

**697.** 26/B 2 P/A Mich. 6080.  
Greenish colourless; fragment of base; no weathering; very bubbly.  
D. base 0.05 m. A.T. base 0.004 m. A.T. side 0.001 m.  
Straight sides with slight downward taper. Base slightly concave. Pontil technique.  
Fabric 8.

**698.** 27/C 51 H<sup>1</sup>/N Mich. 6185.  
Yellow; fragment of base; no weathering; bubbly.  
D. base 0.05 m. A.T. base 0.0035 m. A.T. side 0.0015 m.  
Sides straight and vertical. Base concave with kick. Pontil technique.  
Fabric 5.

**699.** 28/C 121 G/C Mich. 6241.  
Green, opaque; fragment of base; milky weathering in spots; very bubbly.  
D. base 0.034 m. A.T. 0.002 m.  
Sides taper slightly downward. Base concave with kick. Pontil technique.  
An early fabric.

2. *With corrugations on body*

Only the following fragmentary specimens occurred:

**700.** 28/C 42 D/EI Mich. 6234. PL. XIX  
Brown; fragment of rim, neck, and shoulder; no weathering; bubbly.  
H. neck 0.045 m. D. rim 0.05 m. A.T. 0.0015 m.  
Rim outsplayed at angle of 45° and folded upward and inward. Neck short and cylindrical. Shoulder horizontal. Body cylindrical with slight downward taper (?). Vertical corrugations on body from shoulder downward.  
Fabric 5.

**701.** 27/B 103/RI Mich. 6159. PL. XIX  
Dark yellow; fragment of base; no weathering; bubbly.  
D. base 0.038 m. A.T. base 0.004 m. A.T. side 0.001 m.  
Sides taper very slightly downward. Base flattened by pressure. Vertical corrugations on body reaching from shoulder (?) to base.  
Fabric 5.

**702.** 25/253 A/B Mich. 6041.

Green; fragment of base; no weathering; bubbly.

D. base 0.038 m. A.T. base 0.0035 m. A.T. side 0.002 m.

Shape and decoration as no. 701.

Fabric 5.

**703.** 25/181/D Mich. 6024.

Dark yellow with purple streaks; fragment of side; no weathering; bubbly.

D. side c. 0.025 m. A.T. 0.003 m.

Sides of body taper downward rather more sharply than in the previous examples.

Corrugations end some distance above the base.

Fabric 5.

### III. COIL BASE

Only the following fragmentary examples were found:

**704.** 27/C 57 G/D Mich. 6204.

PL. XIX

Greenish colourless with bluish green coil; base and lower part of sides; milky; bubbly.

D. base 0.054 m. A.T. side 0.0015 m.

Sides vertical with slight concavity. Base slightly concave. Coil at edge of base, pressed well in.

Fabric 3 (?).

**705.** 24/4037 A/D Mich. 5869.

Greenish colourless with bluish green coil; fragment of base and side; milky weathering; pin-prick bubbles.

D. base 0.053 m. A.T. side 0.003 m.

Shape as no. 704.

Fabric 3 (?).

**706.** 24/4030 A/I Mich. 5656.

Yellowish with purplish streaks, green coil; base and part of sides; no weathering; some bubbles.

D. base 0.036 m. A.T. 0.0015 m.

Sides taper downward. Base flat with slight central kick. Pontil technique. Thick coil at edge of base, not pressed in.

Fabric 4 (?).

**707.** 28/B 136 D/C.

A base fragment as no. 706, yellowish colourless with dark blue coil.

### IV. BASE WITH PINCHED KNOBS

Only one base fragment occurred.

**708.** 27/C 55 A/TII Mich. 6195.

PL. XIX

Greenish colourless; fragment of base and side; frosted; material fair.

D. base 0.045 m. A.T. base 0.004 m. A.T. side 0.001 m.

Sides taper slightly downward. Base flat below and concave above. Row of knobs all round, pressed out sideways from base.<sup>1</sup>

Fabric 2 or 3.

<sup>1</sup> They do not, therefore, act as toes, but are merely decorative.

### C. SHORT NECK, OVOID BODY

Only the following example, with tubular base ring, occurred:

709. 25/332 A/E Cairo J 52759. PLS. IX and XIX  
Colourless with greenish tinge; in many fragments, nearly complete; dirty, and a few  
traces of iridescence; material good; some bubbles.

H. 0.175 m. G.D. 0.095 m. A.T. body 0.002 m.

Rim outsplayed, and rounded at edge with cut-out just below. Neck shortish, sides  
taper upward. Shoulder strongly sloped with very gentle curve between it and  
the neck. Body ovoid, greatest diameter at top. Sides slightly convex. Base flat,  
with small kick in centre. Tubular, pushed-in base ring. Two horizontal coils of  
similar glass near base of neck. Very symmetrical.

Fabric I.

## CLASS XI

### ONE-HANDED JUGS AND BOTTLES

THOUGH only eight complete or tolerably complete examples of class XI occurred, the numerous smaller fragments, of which only a selection is listed, suggest that the class was as common in Roman Egypt as it was in other parts of the Empire. Some of the types—the more elaborate shapes and wares—were probably used as wine-jugs or oil-jugs for the table: others—the plainer—were for transporting wine and other liquids from place to place.<sup>1</sup>

The class is divided into three main groups:

- A. Ovoid or bulbous jugs;
- B. Cylindrical bottle-jugs;
- C. Rectangular bottles.

These groups are subdivided on the basis of minor variations in shape and technique. Decoration is rare, and chiefly confined to raised threads and coils, with the exception of some of the bottle-jugs of group B, which have cut or scratched patterns on the body.

The ovoid and bulbous jugs (group A) are akin in shape to certain of the flasks of class IX, in some cases only differing from them in having a handle. The jugs of division i, for instance, with a constriction at the base of the neck, are equivalent to the flasks of IX A, and some of those of division ii, with no neck constriction, are equivalent to some of the flasks of IX B. Division iii, funnel-necked jugs, though akin in shape to some of the flasks of IX B, are not really parallel to any one type in that class. Apart from variations in the shape of the neck, the chief differences to be noted in these A types are in the lip, which may be circular, trefoil, or spouted, and in the rim, which may be folded or rounded. The larger examples were probably used for wine or other drinks, the smaller more likely for oil.

The glasses in divisions i and ii mainly belong to one or other of fabrics 3–7, but a few, notably most of the small, spouted jugs of ii (c) are of fabric 8 or else are colourless and belong either to fabric 2 or to a poor ware which may be a colourless kind of fabric 9. Only one example in this whole group, no. 725, comes from an early

<sup>1</sup> Two fragmentary examples, nos. 759 and 763, seem to be Syrian; if so, it was for their contents and not for themselves that they were brought into Egypt.

B-period house: the majority are from Constantinian houses; a few are from the top layer. It looks, therefore, as if these types, with the possible exception of the funnel-necked variety, were not common until the Constantinian period, and were not made in colourless wares.

Among other Egyptian finds no examples belonging to either division i or division iii can be recorded: this is specially surprising in the case of division i, not only because of the frequency of the flask with constricted neck in Egypt, but also because of the numbers of actual jugs of that type which are found in other provinces. On the other hand, jugs belonging to division ii are as numerous as they are varied in type; no two specimens can be said to be exactly alike.

This evidence from other finds is so large that it has seemed advisable to use it to supplement the classification arrived at on the basis of the Karanis finds, and the results have been included in the skeleton classification. Minute subdivisions based on decorative details have not been attempted. Unless otherwise stated the vases have coils on the neck or rim, or both. The following is a list, by type, of the pieces upon which this supplementary classification has been based:

- (a) Circular mouth
  - i. Folded rim
    - (α) Pad base (i.e., type of no. 712):
      - Edgar, *Cat.*, no. 32781 (from Karanis).
      - 32546 (with thumb indents on body).
      - 32548 (with thumb indents on body).
      - Cairo, J 46479-80; see App., p. 316.
      - Askren collection, Mich. 5157 (no coils on neck or rim); see App., p. 326.
      - Boston, 13. 4297 (rim missing, but almost certainly of this type: brown, fabric 4).
      - Lyons, one example (yellow,<sup>1</sup> fabric 4).
    - (β) Concave base:
      - Edgar, *Cat.*, nos. 32550-1.
      - Askren collection, Mich. 5158; see App., p. 327.
    - (γ) Base coil:
      - Oxford, 1890.632 (from Akhmim: small vase, yellowish green, fabric 4).
      - Kaiser Friedrich Museum, Arabic Section, 4383 (small, purplish, with green handles and coils, fabric 6).
      - Brunton, *Qau and Badari*, iii, pl. li, 6 (from Qau: S-shaped corrugations on body).<sup>2</sup>

<sup>1</sup> The jug was acquired many years ago, and no details of provenance exist, but internal evidence leaves no doubt of its Egyptian origin.

<sup>2</sup> The base on this example is perhaps tubular, rather than a coil; it is impossible to tell from the illustration.

- 2. Rounded rim
  - (α) Pad base:  
British Museum, bought in 1891 (from the Fayûm: yellow, fabric 4).
  - (β) Concave base:  
Edgar, *Cat.*, nos. 32552-3.
  - (γ) Base coil:  
Edgar, *Cat.*, no. 32752 (from Fag-el-Gamus).
  - (δ) Stemmed base—no examples.
- (b) Trefoil mouth
  - 1. Folded rim
    - (α) Pad base (i.e., type of no. 720):  
Edgar, *Cat.*, nos. 32547 and 32549 (both with thumb indents on body).
    - (β) Concave base:  
The Oriental Institute, the University of Chicago, one example (no coils).  
Junker, *Ermenne*, p. 19 (no coils).
  - 2. Rounded rim—no examples.
- (c) Spouted mouth
  - 1. Folded rim, inward (i.e., type of no. 723):
    - Brussels, E 2553 (from *Oxyrhynchus*, 1904-5).
    - Askren collection, Mich. 5218; see App., p. 327.

Further finds in Egypt, at Karanis and elsewhere, will doubtless necessitate more subdivisions.

Parallel types outside Egypt are even more numerous, as a glance at the lists in Kisa (forms C 174—E 263), and in Morin-Jean (forms 44-61 and 67) will show.

There is, first of all, a large and important group in the west which is akin to type i in having a constriction at the base of the neck. Such vessels, which may have bulbous or inverted-piriform bodies and usually have angular handles, ribbed on the outside, were common all over the western provinces, principally during the first two centuries of the Empire.<sup>1</sup> Morin-Jean states that the type lasted from the second to the fourth century,<sup>2</sup> but it was certainly common in the first also, for numerous fragments are found in conjunction with Flavian pottery on sites in England and elsewhere; the angular, ribbed handles were copied from pottery jugs of the period.<sup>3</sup> This early

<sup>1</sup> Morin-Jean, form 58, and Kisa, E 253-6 and 258. For examples see Morin-Jean, figs. 141-3; Fremersdorf, *Denkmäler*, figs. 5 and 14 (both dated to the first century); Kisa, fig. 159 a; and an English one in the British and Mediaeval Department of the British Museum from Barnwell, Cambridgeshire, *Slade Cat.*, no. 264, p. 44, fig. 64. See also Thorpe, *Proc. Soc. Antiq. Scot.*, lxviii, 439 ff.

<sup>2</sup> Morin-Jean, pp. 117-18.

<sup>3</sup> See, e.g., Henning, *Denkm. elsässischen Altert.-Sammel. zu Strassburg*, p. 30, pl. xxviii, 12, 14, 16; May, *Roman Pottery at Colchester*, pl. xlvi, 201; *id.*, *Silchester*, pl. lxii, 113. For eastern examples see Dragendorff, *Thera*, ii, 285, fig. 480; Froehner, *Gréau Cat.*, pl. cccxxxiv, 3 (from Cyprus); and Oxford, 1923, 228 (from Sparta), and 1881, 109 and C 169 (from Cyprus).

occurrence of the constricted neck on vessels on western sites would suggest that it was common in Egypt in that early period also, and that it is only lack of evidence of date that prevents the recognition of the fact.

Among the examples that fall under division ii, i.e., Morin-Jean's forms 44-57, 59-61, and 67, and Kisa's forms C 174-E 252 and E 259-263, an endless number of variants occurs. The circular mouth is commonest, but both trefoil and spouted mouths are frequent: similarly, though the commonest types of base are the pushed-in and the concave, both pad bases and stemmed bases are not unknown, principally occurring in the east. Rims may be either folded or rounded. In view of this diversity of type, published examples directly parallel to the various Karanis types are not numerous. They occur chiefly if not entirely in Syria. Like (a) 1 (a), for instance, are two pieces from Syria in the Niessen collection,<sup>1</sup> like (a) 1 (δ) and (a) 2 (a) are two in Oxford, bought in Beirut,<sup>2</sup> and like (b) 2 (a) is one in the Victoria and Albert Museum from Nazareth (Beck loan, no. 653), and one in the Slade collection in the British Museum.<sup>3</sup> Further specimens might be quoted.

Nothing quite like the funnel-neck jugs of division iii occurs elsewhere. The nearest approaches are forms like Kisa's D 250-E 252 and Morin-Jean's 60-1.

The cylindrical bottle-jugs, group B, are akin rather to class X than to class IX. They all have a circular mouth, and a cylindrical neck and body, and are very uniform. Their rims are sometimes folded and sometimes rounded, and their bodies may be plain or decorated with a geometrical pattern of cut or scratched lines or facets.

With one exception, these vases belong to fabric 3, 4, or 5, and as they are found chiefly in C-period or top-layer houses, there can be no doubt that they are late. The cutting on the examples of 3 (a), even if it has not actually degenerated into mere scratching, is always poor, late work. They cannot date, therefore, before about 300. The one exception is the fragment of a green bottle listed under division 2. It comes from a fairly early house, 5006—one of the earliest so far found on the Kôm apart from the B-period houses of 1926—and is of fabric 9, being thus more akin to the bottles of group C than to the

<sup>1</sup> Niessen Cat., nos. 1037-8, pl. lii.

<sup>2</sup> Nos. 1912, 140 and 1913, 137 respectively.

<sup>3</sup> Slade Cat., no. 240, p. 39, fig. 56, of uncertain provenance.

other vessels of group **B**. The type, though otherwise unrepresented at Karanis, is very common elsewhere, and is usually considered to be of first to second century date.

Other Egyptian examples of these bottle-jugs are not very common. The type with folded rim, **1**, is represented by one specimen in Edgar's catalogue, no. 32540; but this piece differs from the Karanis examples in having a vertical rim, folded outward, downward, and upward (like those of the flasks, IX a i (c), &c.), instead of an outsplayed rim folded upward and inward. It is also peculiar in having horizontal wheel-cut lines on the body. For type **2**, with folded and flattened rim, no Egyptian parallels can be adduced, but type **3** is represented by several specimens. First, and most important, is a fragmentary example from Hawara now in the Petrie collection in University College, London. Only fragments of the body and base are preserved, but there can be no doubt that they belong either here or to the parallel group in class XII (p. 255). The body is decorated with an elaborate cut design consisting of two horizontal bands of alternating medallions and pilasters flanked above and below by cut borders. Within each medallion is a female head cut in the finest technique with incised shading for the details. In the upper row the heads are to the right, in the lower to the left. On the base is a radiate cut design. This piece with its fine cut work of early date shows that the type existed much earlier in Egypt than would have been suspected from the Karanis fragments (type  $\beta$ ), which all have scratched designs. Four examples in Cairo<sup>1</sup> have plain bodies with coils on the neck and rim like the fragmentary pieces listed under (a); an example found at Oxyrhynchus by Petrie<sup>2</sup> bears on its body an elaborate geometrical pattern in scratched technique (like type  $\beta$ ); and another found at Karanòg<sup>3</sup> has a cut-out roll below the rim and a decoration of horizontal wheel cuts on the body, a variant not yet found at Karanis.

Outside Egypt cylindrical bottle-jugs are extremely common at all periods. They fall into two main divisions. First, and earlier in date, is the large group made of heavy green or bluish green glass of the shape of Morin-Jean form 8 and Kisa form c 173, and parallel to the solitary fragment no. 735 in the Catalogue. Their rims are either

<sup>1</sup> Three in Edgar's catalogue, nos. 32543-5, and one other example from Karanis, no. J 46478; see App., p. 316.

<sup>2</sup> Now in the British Museum, bought in 1922; Petrie, *Tombs of Courtiers*, p. 16.

<sup>3</sup> Woolley and MacIver, *Karanòg*, no. 7361 (G 217), pl. xxxix.

folded inward and flattened on top, or else folded outward, downward, and upward. These occur on both eastern and western sites, and were used principally for the transport of liquids. Many of the larger examples were used, or rather re-used probably, as cinerary urns.<sup>1</sup> Examples, which are extremely common in museums and collections, mostly belong to the first or second century, and the type was apparently gradually ousted by the rectangular bottle of group c. There is in the Niessen collection<sup>2</sup> an interesting copy of this type in green glazed ware with a diamond pattern on the body, and Meroitic pottery copies occur in Nubia.<sup>3</sup>

The second main division includes several distinct subtypes, the general shape of which is given by Morin-Jean's form 9 (but in a one-handled variant of that listed), and Kisa's forms E 264-7. Some have folded, some rounded rims: some are plain or have only horizontal coils for decoration; others have more elaborate decoration of trailed-on threads or cut or mould-blown patterns. Amongst them, therefore, can be found parallels for all the remaining Karanis variants of group b. Numerous plain bottles, some with folded rim, and some with rounded rim, are listed in the Niessen collection from both Cologne and Syria:<sup>4</sup> these are parallel to the pieces listed under 1 and 3 (a) in the Catalogue. Examples with cut or scratched decoration like type 3 (β) but with varying shapes of rim are also common.<sup>5</sup> Others bear kinds of decoration not so far represented on this type at Karanis.<sup>6</sup> All are lighter and of better material than the green bottles of the former division, and they were doubtless intended for table or household use rather than for transport. They appear also to be on the whole later in date than those bottles and to belong chiefly to the last two centuries of the Empire.

One other kind of bottle-jug should be mentioned, for it is very

<sup>1</sup> For western examples see Morin-Jean, fig. 27; Fremersdorf, *Denkmäler*, pl. xi, 3; Kisa, fig. 54; and Niessen Cat., nos. 435 and 437, pl. xxxv: and for eastern, Cesnola, *Atlas*, iii, pl. xc, 5 (from Ormidia); and A. P. di Cesnola, *Lawrence-Cesnola Coll. of Cyprus Antiq.*, 1881, pl. ix (2 examples).

<sup>2</sup> Niessen Cat., no. 1718, pls. lxxvi and xciv (from Cologne).

<sup>3</sup> *Liv. Ann.*, xi, 150, pl. xxiii, type xliii A (now in Oxford, 1912. 1296), from Faras; and Woolley and MacIver, *Karanòg*, pl. cv, type F xxxvi, and pl. lvii, 8189.

<sup>4</sup> Niessen Cat., nos. 424-44, pl. xxxv (from Cologne), and nos. 1043-4, pl. lii (from Syria); see also de Ridder, no. 349, p. 185, pl. xvi, for another Syrian example.

<sup>5</sup> E.g., Kisa, figs. 234 and 239 (three in the Vom Rath coll.) and Niessen Cat., nos. 318, pl. xxvi, and 319, pl. xxiv; and, from Kerch, an example in the British Museum (given by S. Loring, 1856) of greenish glass with rim folded outward, downward, and upward, and with horizontal wheel incisions on the body.

<sup>6</sup> E.g., Morin-Jean, figs. 247 (mould-blown decoration) and 283 (snake-thread decoration).

common in the west, though it is not so far known in any eastern province. This is the 'barellet' or barrel-jug, with body mould-blown in the shape of a barrel with horizontal hoops.<sup>1</sup> The type is equally common with two handles instead of one.<sup>2</sup>

Group C, the rectangular bottles, are also homogeneous, only varying in the technique of manufacture. Some of them are mould-blown, the others are plain-blown and afterwards pressed flat on their base and on four sides. All have folded rims, with the exception of no. 764, which has a rounded rim with a cut-out just below; not one is decorated.

The mould-blown examples all belong, again with the exception of no. 764,<sup>3</sup> to fabric 9, while the plain-blown examples belong either to that same ware or to fabric 8. The mould-blown examples are mostly from B-period houses of 1926 or from 5000 or C-period houses: some of the plain-blown examples also come from these earlier levels, though others have been found in the top layer. The type, therefore, was long-lived. At first, the mould-blown technique was preferred: later it was discovered that equally serviceable vases could be made by the simple blowing process if they were afterwards flattened on four sides. These vases are all of common glass, and are all undecorated; they were the ordinary ware used for packing liquids for transport, hence the adoption of the rectangular shape, which makes them easier to pack and more stable and less liable to injury during transport. The fact that in the earliest houses they are the only type of jug found may indicate that they were at first used as table jugs as well as for transport. If so, they seem to have been superseded as table ware in the later period by the jugs of group A.

Most of these varieties can be paralleled from other Egyptian finds. Of mould-blown rectangular bottles of the type of 1 (a) there is an example in Edgar's catalogue, no. 32541, and two others are known from the Sudan. One, a very tall piece, 0.52 m. high, was found at Faras by the Oxford Expedition to Nubia,<sup>4</sup> and the other was found by Reisner at Kerma.<sup>5</sup> A kindred type to these, but with

<sup>1</sup> Morin-Jean, pp. 170 ff., and Kisa, pp. 786 ff. The form is no. 132 in Morin-Jean's list and nos. C 154-5 (two-handled) and E 268 (one-handled) in Kisa's.

<sup>2</sup> See p. 257 below.

<sup>3</sup> In both these exceptional characteristics this piece is parallel to the fragments B 3 (a) above, so that it must be merely a stray variant of that type.

<sup>4</sup> Now in Oxford, 1912. 434; *Liv. Ann.*, xi, 153, pl. xxxi, II.

<sup>5</sup> Now in Boston, no. 13. 4027; Reisner, *Excav. at Kerma, Harvard African Studies*, v, 47, fig. 20, 63.

hexagonal body and faint mould-blown decoration on its sides, comes from Karanòg.<sup>1</sup>

Of the plain-blown type with flattened sides, 1 ( $\beta$ ), there are two examples in Cairo from Karanis, nos. J 45777 and 47265,<sup>2</sup> and others have been found at Ermenne,<sup>3</sup> and Karanòg.<sup>4</sup>

Type 2 is not known elsewhere in Egypt, but several complete examples of type 3 from other sites can be added to the solitary fragment from Karanis. There are two in Edgar—no. 32542, and no. 32771 from Armant; and others are in the Askren collection (Mich. 5156; see App., p. 327) and in Boston (no. 04. 1940, from Hu). To these should be added the three bottles found in a wooden box at Akhmin and now preserved, with their box, in the British Museum.<sup>5</sup>

But the rectangular bottle is one of the commonest types of glass not only in Egypt, but all over the Empire. Outside Egypt the overwhelming majority of the examples belong to the common green or bluish green bottle ware, and are mould-blown, with a pattern or stamp on the base. The rims are usually folded inward and flattened to a horizontal position on top, but the type folded outward, downward, and upward (division 2) and the half-way type like that of the Karanis fragment no. 763 are also found—the latter being specially common in Syria. The group is fully discussed by Morin-Jean<sup>6</sup> and by Kisa.<sup>7</sup> It lasted both in the east<sup>8</sup> and in the west throughout the Imperial period, being manufactured in various centres and used primarily for the transport of liquids. In the west it has, like its counterpart the cylindrical bottle, a secondary use as a cinerary urn.

Hexagonal bottles, closely akin in all respects except shape of body to these rectangular examples, are common both in Syria and in the west, though so far the only example of the type from an Egyptian site is the one found by Woolley and MacIver at

<sup>1</sup> Woolley and MacIver, *Karanòg*, no. 7338 (G 314), pl. xxxvii.

<sup>2</sup> The latter is published by Wainwright, *Annales*, xxiv, 116; for the former see App., p. 316.

<sup>3</sup> Junker, *Ermenne*, p. 19.

<sup>4</sup> Woolley and MacIver, *Karanòg*, no. 7339 (G 278), pl. xxxvii.

<sup>5</sup> Egyptian Department, no. 20774. The box is divided into four compartments. Three are occupied by these bottles and the fourth by a jar of class VIII D (p. 178 above). All four vases are yellow, fabric 4.

<sup>6</sup> Morin-Jean, form 14, pp. 61 ff., figs. 41–6, 329, and 335.

<sup>7</sup> Kisa, pp. 323 ff. and 777 ff., fig. 64. Strangely enough, the form has been omitted inadvertently from Kisa's *Formentafeln*.

<sup>8</sup> For eastern examples see de Ridder, no. 368, p. 191, pl. xviii, and others quoted *ad loc.*

Karanòg (see above). The type is Morin-Jean's form 17<sup>1</sup> and Kisa's E 269-70.<sup>2</sup>

The lighter type of rectangular bottle with pressed sides (like the fragment with rounded rim, subdivision 3) does not seem to occur outside Egypt, but a light, mould-blown type with geometrical and other patterns is fairly frequent in Syria during the later Imperial period, and hexagonal bottles of such a kind are even more usual.<sup>3</sup>

Two uncertain fragments which may belong to some type of jug or bottle are appended at the end of this class.

#### SKELETON CLASSIFICATION

- A. Ovoid or bulbous jugs
  - I. Cylindrical neck with constriction at base
    - (a) Circular mouth
    - (b) Trefoil mouth
  - II. Cylindrical neck without constriction at base
    - (a) Circular mouth
      - 1. Folded rim
        - (α) Pad base
        - (β) Concave base—NO EXAMPLES
        - (γ) Base coil—NO EXAMPLES
        - (δ) Stemmed base
      - 2. Rounded rim
        - (α) Pad base—NO EXAMPLES
        - (β) Concave base—NO EXAMPLES
        - (γ) Base coil—NO EXAMPLES
    - (b) Trefoil mouth
      - 1. Folded rim
        - (α) Pad base
        - (β) Concave base—NO EXAMPLES
      - 2. Rounded rim
        - (α) Pad base
  - III. Funnel neck
    - 1. Folded rim, inward
    - 2. Folded rim, outward, downward, and upward
    - 3. Rounded rim

<sup>1</sup> Morin-Jean, pp. 65 ff., figs. 51-3.

<sup>2</sup> Kisa, pp. 323 ff. and 777 ff., figs. 15 (two hexagonal bottles in a handled container) and 64.

<sup>3</sup> A good example of each is illustrated in *Niessen Cat.*, nos. 1048 (hexagonal) and 1049 (rectangular), pl. liii, and another hexagonal piece is figured by Kisa, fig. 332.

## B. Cylindrical bottle-jugs

All have cylindrical necks and circular mouths

1. Folded rim, inward
2. Folded rim, inward, pressed flat on top
3. Rounded rim
  - (α) Plain, or with added coils only
  - (β) Cut or scratched decoration

## C. Rectangular bottles

All have cylindrical necks and circular mouths

1. Folded rim, inward, pressed flat on top
  - (α) Mould-blown
  - (β) Plain-blown, with flattened sides and base
2. Folded rim, outward, downward, and upward
3. Rounded rim

## D. Uncertain fragments, perhaps belonging to some type of jug or bottle

## A. OVOID OR BULBOUS JUGS

## I. CYLINDRICAL NECK WITH CONSTRICKTION AT BASE

Only two fragmentary specimens were identifiable.<sup>1</sup> Both have folded rims.

## (a) CIRCULAR MOUTH

710. 25/4011/L Mich. 6059.

Yellow with green handle; fragment of neck and rim; no weathering; bubbly.

H. neck 0.043 m. A.T. 0.002 m.

Rim outsplayed and folded upward and inward. Neck cylindrical with deep cut-in at base. Remains of handle at rim. Body lost.

Fabric 5.

## (b) TREFOIL MOUTH

711. 25/5072 F/N Mich. 6068.

PL. XIX

Dark blue; handle complete and many other fragments; milky-pitting weathering; bubbly.

A large jug, handle 0.12 m. high. A.T. body 0.0015 m.

Mouth outsplayed and pinched to trefoil shape, rim folded inward and downward.

Neck cylindrical with constriction at base. Body probably inverted-piriform.

No fragments of base. Flat handle, thin in centre with two thick rolls at the edges.

Fabric 7.

<sup>1</sup> Besides those listed, other fragments of bodies and necks may have occurred both of this type and of the following XI A types, but, if so, in the absence of traces of a handle, they were indistinguishable from fragments of flasks.

## II. CYLINDRICAL NECK WITHOUT CONSTRICKTION AT BASE

## (a) CIRCULAR MOUTH

Only the following fragmentary specimens were identified, but the classification has been amplified on the basis of other Egyptian finds:

1. *Folded rim*(α) *Pad base*

Here are also included, for the sake of simplicity, all fragments with folded rims which give no evidence as to their base technique.

**712.** 27/c 51 H<sup>2</sup>/B Mich. 6187.

PL. XIX

Green; a fragment of neck, rim, and handle, and a fragment of body and base; dirty, small patch of milky weathering; some pin-prick bubbles and some impurities.

H. c. 0.16 m. G.D. 0.068 m. A.T. 0.001 m.

Rim well outsplayed and folded upward and inward. Neck cylindrical. Shoulder sloping. Body ovoid with greatest diameter near top. Pad base with outsplayed ring and slight kick. Pontil technique. Faint traces of modelling marks on outside of base ring. Beneath rim a quadruple spiral thread; a single coil at base of neck; and a handle, four-ribbed, from rim to shoulder, all of similar glass.

Fabric 4.

**713.** 27/c 56 B/U Mich. 6198.

Green; fragment of neck and handle; no weathering; bubbly.

H. handle 0.08 m. A.T. 0.002 m.

Shape as no. 712, but no ribs on handle. Spiral coil below rim, and a very thick horizontal coil at base of neck.

Fabric 5.

**714.** 24/4033/c Mich. 5461.

Yellow with green coils and handle; fragment of neck and rim; no weathering; pin-prick bubbles.

D. rim 0.065 m. A.T. 0.0015 m.

Shape as no. 712. Triple spiral coil below rim.

Fabric 4.

**715.** 27/c 57 H/c Mich. 6205.

Pale green with dark bluish green handle and coil; fragment of rim and neck; traces of iridescence, some strain cracks; bubbly.

H. neck 0.03 m. A.T. 0.001 m.

Rim and neck as no. 712. Body probably bulbous. Thick horizontal coil near base of neck. Handle joining rim and shoulder.

Fabric 4.

**716.** 28/217 B\*/B.

Yellow with green handle and coils; fragment of rim, neck, and handle; no weathering; bubbly.

From a large jug.

Rim and neck as no. 712. Body probably bulbous. Two horizontal coils on neck, one near top, one near bottom. Handle joining neck and shoulder.

Fabric 4.

**717. 28/C 87 A/A.**

Colourless with turquoise blue coil and handle; fragment of rim, neck, and handle; no weathering; material good.

From a smallish jug, H. neck 0.03 m.

Rim and neck as no. 712. Body probably bulbous. Horizontal coil below rim. Handle joining rim and shoulder.

Fabric 2.

**718. 24/5021 B/G Mich. 5780.**

Light green; base ring and part of body; strain cracks; pin-prick bubbles.

D. base ring 0.045 m. A.T. body 0.0015 m.

Almost flat pad base. Pontil technique with thick pontil wad. Slanting impressions on outside of ring. Body ovoid (?) with vertical thumb indents.

Fabric 5.

(β) *Concave base*

No examples occurred.

(γ) *Base coil*

No examples occurred.

(δ) *Stemmed base*

One fragment occurred.

**719. 27/C 41 A/L1 Mich. 6173.**

PL. XIX

Yellow; fragment of stemmed base; no weathering; some bubbles.

D. base 0.04 m.

Ovoid (?) body ending in short twisted stem, broadening out below to a splayed base.

Base concave. Well-marked criss-cross slanting impressions on base. Pontil technique.

Fabric 4.

2. *Rounded rim*(α) *Pad base*

No examples occurred.

(β) *Concave base*

No examples occurred.

(γ) *Base coil*

No examples occurred.

(b) *TREFOIL MOUTH*

Two complete examples and a fragmentary one occurred.

1. *Folded rim*(α) *Pad base***720. 28/C 42 J/Y Mich. 5948.**

PLS. IX and XIX

Yellow with greenish yellow handle; intact; contents stain within, traces of blackish and iridescent pitting on rim; very bubbly, but not many impurities.

H. 0.16 m. G.D. body 0.089 m. A.T. 0.001 m.

Mouth outsplayed and pinched to trefoil shape, rim folded inward and downward.

Neck short and cylindrical. Shoulder sloping. Body ovoid with greatest diameter

near top. Sides strongly convex. Pad base with kick below, and well-marked criss-cross slanting impressions on exterior of ring. Pontil technique. Five irregularly placed thumb indents on body. Triple spiral thread below rim and thick coil at base of neck, both of similar glass. Flattened handle joining rim and shoulder.

Fabric 4.

**721.** 24/5014 A/G Mich. 5779.

Wine-coloured with green coils; fragment of neck and rim; no weathering; bubbly; blowing spirals noticeable.

H. neck c. 0.06 m. A.T. 0.002 m.

Mouth outsplayed and pinched to trefoil shape, rim folded upward and inward.

Spiral coil from beneath rim to base of neck.

Fabric 6.

(β) *Concave base*

No examples occurred.

2. *Rounded rim*

(α) *Pad base*

**722.** 27/C 45 B/X Cairo J 52760.

FRONTISPIECE and PL. XIX

Green; repaired, a few pieces of body missing; the whole covered with a spotty and streaky milky weathering, partly white and partly pink in tint; bubbly; blowing spirals very noticeable owing to weathering.

H. 0.20 m. G.D. body 0.078 m. A.T. neck 0.0025 m. A.T. body 0.0008 m.

Mouth well outsplayed and pinched at back and sides to trefoil shape, rim rounded.

Neck nearly cylindrical with slight upward taper. Shoulder sloping. Body ovoid with greatest diameter at top and very slightly convex sides. Pad base with slight kick below and faint modelling marks on exterior of ring. Pontil technique. Spiral coil starting in thick revolution at rim and winding in thinner bands to base of neck. Handle, thin in centre, and with two thick coils at edges, joining rim and shoulder. Coil and handle of similar glass.

Fabric 5.

(c) *SPOUTED MOUTH*

The following fragmentary specimens occurred, none of which is sufficiently complete to show its base technique:

1. *Folded rim, inward*

**723.** 25/5026 E/E Mich. 6063.

PL. XIX

Greenish colourless; fragment of rim and neck; no weathering; material very bad and bubbly; streaks of stone.

H. neck 0.04 m. A.T. 0.002 m.

Mouth outsplayed and pinched on two sides to form spout; rim folded upward and inward. Neck cylindrical. Body bulbous (?). Mark of junction of handle at rim.

Fabric 9 (?)

**724.** 24/130 C/P Mich. 5400.

Colourless with greenish tinge; fragment of rim and neck; no weathering; bubbly.

H. neck 0.025 m. A.T. 0.001 m.

Shape as no. 723.

Late fabric 2 (?).

2. *Folded rim, outward, downward, and upward*

725. 26/B 24 P/J Mich. 6119.

PL. XIX

Colourless with greenish tinge; fragment of rim and neck; traces of milky weathering; very bad glass, full of bubbles and impurities, and streaks of stone.

H. neck 0.042 m. A.T. 0.0015 m.

Mouth outsplayed and pinched in on two sides to form spout. Rim folded outward, downward, and upward. Neck cylindrical. Body bulbous (?). No remains of handle which joined shoulder and rim.

Fabric 9 (?).

726. 24/124 C/F Mich. 5877.

Colourless with greenish tinge; fragment of rim and neck; no weathering; very bubbly.

D. rim 0.042 m. A.T. 0.002 m.

Shape as no. 725. Trace of handle at rim, as dotted in on no. 725, Pl. xix.

Late fabric 2 (?).

3. *Rounded rim*

727. 27/C 43 G/C Mich. 6179.

Green with darker handle and coil; fragment of rim and neck; well-advanced spotty, milky weathering; bubbly.

H. neck 0.045 m. A.T. 0.001 m.

Mouth well outsplayed and pinched in on two sides to form spout. Rim rounded. Neck cylindrical. Body bulbous (?). Horizontal coil underneath rim. Trace of handle at top of neck which passed thence to the rim and so to shoulder.

Fabric 5 (?).

## III. FUNNEL NECK

The following fragmentary specimens occurred. All have circular mouths. Not one is sufficiently preserved to give evidence of base technique.

1. *Folded rim, inward*

728. 28/B 152 B/R Mich. 6230.

PL. XIX

Colourless with greenish colourless handle; fragment of neck, shoulder, and handle; no weathering; pin-prick bubbles.

D. rim 0.035 m. A.T. 0.0012 m.

Circular funnel neck outsplayed at angle of 45°, rim folded inward and downward.

Constriction at junction of neck and shoulder. Body inverted-piriform (?).

Handle of slightly greener tinge joining rim and shoulder.

Fabric 2.

729. 24/5006 A/AA Mich. 5841.

Bluish green; fragment of neck, shoulder, and handle; spots of milky weathering; very bubbly.

D. rim 0.048 m. A.T. 0.0015 m.

Circular funnel neck outsplayed at angle of 60°, rim folded inward and downward.

Constriction at junction of neck and shoulder. Body inverted-piriform (?).

Handle of similar glass from rim to shoulder.

Fabric 8.

730. 26/B 12 D<sup>1</sup>/B Mich. 6110.  
 28/152\*/AII (two examples).  
 28/B 157 A/N.

Similar fragments of neck and shoulder, all greenish. Fabric 8.

2. *Folded rim, outward, downward, and upward*

731. 24/124 E/V Mich. 5846.

PL. XIX

Colourless with greenish tinge; fragment of neck, shoulder, and handle; no weathering; material fair; some pin-prick bubbles.

D. rim 0.046 m. A.T. 0.003 m.

Circular funnel neck, outsplayed at angle of 60°, rim folded outward, downward, and upward. Constriction at junction of neck and shoulder. Body inverted-piriform (?). Flat handle of similar glass from rim to shoulder.

Fabric 1.

B. CYLINDRICAL BOTTLE-JUGS

All are of essentially the same type, only differing from one another in rim technique and decoration.

1. *Folded rim, inward*

Not one has any decoration. Two complete specimens and one fragment of a neck and shoulder occurred.

732. 28/C 42 J/Z Mich. 5946.

PLS. IX and XIX

Yellow, with greenish yellow handle and coil; chip out of rim; patch of purplish iridescence; very bubbly; some traces of stone.

H. 0.217 m. G.D. body 0.092 m. A.T. 0.001 m.

Mouth outsplayed, rim rounded and partially folded inward. Neck narrow and roughly cylindrical. Shoulder sloping. Body cylindrical with sides tapering very slightly downward. Base concave with kick. Pontil technique. Thick horizontal coil beneath lip, flat handle joining rim and shoulder.

Fabric 4.

733. 27/209 C/NI.

Olive green; repaired, some fragments of rim and body missing; contents stain and patches of iridescence and milky weathering; bubbly; handle very bubbly, with much stone.

H. 0.21 m. G.D. body 0.081 m. A.T. 0.0015 m.

Shape as no. 732 but rim fully folded upward and inward. Shoulder more horizontal with roll or bulge at its junction with body and slight bulge in sides of body about two-thirds of the way down.

Fabric 4 or 5.

734. 25/5093 A<sup>2</sup>/B Mich. 6074.

PL. XIX

Streaky brownish purple, with green coil and handle; fragments of neck, rim, handle, and part of body; usage scratches, milky weathering; bubbly.

D. shoulder 0.077 m. A.T. 0.002 m.

Shape as no. 732, but neck broadens out downward. Horizontal coil underneath rim. Triple-ribbed handle from rim to shoulder.

Fabric 6.

2. *Folded rim, inward, pressed flat on top*

Only one fragment occurred.

735. 24/5006 D/D Mich. 5874.

PL. XIX

Green; fragment of neck, rim, and handle; no weathering; very bubbly, with black impurities and patches of stone.

D. body 0.05 m. A.T. 0.002 m.

Mouth outsplayed, rim folded upward and inward, and flattened to horizontal position by pressure. Neck short and cylindrical. Shoulder sloping. Body cylindrical. Flat handle of similar glass from rim to shoulder.

Fabric 9.

3. *Rounded rim*(α) *Plain, or with added coils only*

Only three fragmentary specimens occurred.

736. 25/5072 F/K Mich. 6067.

Green with dark blue handle and coil; fragment of neck, rim, and handle; patches of milky iridescence; bubbly; blowing spirals.

D. rim 0.047 m. A.T. 0.002 m.

Rim outsplayed and rounded. Neck cylindrical. Shoulder sloping. Coil below rim; triple-ribbed handle.

Fabric 5.

737. 24/116 C/E Mich. 5430.

Green; fragment of neck, rim, and handle; no weathering; very bubbly, with many black impurities.

D. rim 0.047 m. A.T. 0.0015 m.

Shape as no. 736. Coil below rim and handle with two thick rolls at edges, both of similar glass.

Fabric 5.

738. 24/121 D<sup>1</sup>/AG Mich. 5373.

Fragment as no. 737, light green. Fabric 5.

(β) *Cut or scratched decoration*

One complete specimen and many fragments occurred; all are listed.

739. 27/B 121 K/H Mich. 5947.

PLS. IX and XIX

Green; intact; blackish brown contents stain, no weathering; bubbly.

H. 0.197 m. G.D. 0.101 m. T. near rim 0.004 m.

Rim well outsplayed, and rounded. Neck roughly cylindrical, broadening out slightly toward base. Shoulder nearly horizontal. Roll in the glass at junction of shoulder and body. Body cylindrical with slight downward taper in sides. Base concave. Horizontal coil underneath rim and broad, four-ribbed handle joining rim and shoulder, both of similar glass. Geometrical pattern all over body consisting of fairly well-cut facets and scratched lines. At top, a horizontal row of small vertical ovals, with two horizontal scratched lines below them; at bottom, another row of small vertical ovals with two horizontal scratched lines above them;

between these borders an alternating pattern repeated five times consisting of (a) a tall oval facet in a panel with a pointed top, and (b) a smaller oval facet within a scratched oval superimposed on a pattern of criss-cross scratches within a double diamond of scratched lines.

Fabric 5.

**740.** 24/109 C/N Mich. 5860.  
25/216 B/A Mich. 6027.

PL. XIX

Greenish colourless; two contiguous fragments of lower part of body; dulled, no weathering; bubbly.

D. body 0.13 m. A.T. 0.004 m.

Cylindrical body, as no. 739, with geometrical decoration. At bottom, a horizontal row of small scratched circles, above which two uneven horizontal scratched lines; above, again, a frieze of large vertical oval facets (well made) with smaller horizontal oval facets (less well made) in the corners above and below; above this, another pair of horizontal scratched lines, and traces of another row of facets.

Fabric 3.

**741.** 26/B 27 A/Q Mich. 6124.

PL. XIX

Yellowish colourless; two fragments of body and base; dirty, no weathering; bubbly. D. body 0.10 m. A.T. 0.002 m.

Shape as no. 739, with decoration of scratched lines. At bottom, a row of sloping lines, above which, three horizontal lines.

Fabric 3.

**742.** 28/B 134 A<sup>1</sup>/A.

Pale olive green; fragment of bottom of body; no weathering; bubbly.

From a large bottle.

Shape as no. 739, with decoration of scratched lines and facets. At bottom, a row of sloping scratched lines, above which two horizontal scratched lines; above, again, a horizontal row of vertical oval facets.

Fabric 3.

**743.** 25/4009 A<sup>1</sup>/K Mich. 6058.

Yellowish colourless; fragment of top of body; no weathering; bubbly.

From a largish bottle.

Shape as no. 739. Two horizontal scratched lines near shoulder, below which a row of vertical oval facets; below, another horizontal scratched line.

Fabric 3.

**744.** 25/249/K Mich. 6038.

Colourless with greenish tinge; fragment of bottom of body; frosted; pin-prick bubbles.

From a large bottle.

Shape as no. 739. At bottom a horizontal row of sloping cuts and, above, two horizontal lines.

Fabric 1.

**745.** 26/B 28 H/E Mich. 6128.

Yellowish colourless; fragment of body; no weathering; bubbly.

From a largish bottle.

Shape as no. 739. Decoration of oval facets and scratched lines, pattern doubtful.

Fabric 3.

746. 27/C 57 J/F Mich. 6207.

Greenish; fragment of body; spots of milky weathering; pin-prick bubbles.

From a bottle of medium size.

Shape as no. 739. Oval facets each within a panel of lines, all roughly cut.

Fabric 2 or 3 (?).

747. 24/5020 B/B Mich. 5783.

Yellowish colourless; fragment of body; frosted in patches, bubbly.

From a largish bottle.

Shape as no. 739. Oval facets, poorly made, each within a panel of scratched lines.

Fabric 3.

748. 27/C 29 H/z Mich. 6172.

Deep purple; fragment of body; milky-pitting weathering well advanced; bubbly.

From a bottle of medium size.

Shape as no. 739. Scratched decoration, pattern doubtful.

Fabric 6.

PL. XX

### C. RECTANGULAR BOTTLES

All are uniform, square or rectangular in horizontal section, with cylindrical neck. They only show differences in the technique of manufacture.

#### 1. *Folded rim, inward, pressed flat on top*

This type was exceedingly common, though no complete specimen has yet been found. From a very large collection of fragments the following have been singled out as representative. The bodies of these bottles were either blown into a mould (bi- or quadripartite) or else plain-blown and afterwards flattened by pressure on the four sides and on the base.

##### (α) *Mould-blown*

749. 24/5010 B<sup>2</sup>/D Mich. 5582.

Dark green; in fragments, incomplete; enamel-like pitting; very bubbly.

D. rim 0.05 m. W. of base 0.085 m. A.T. 0.003 m.

Rim outsplayed, folded upward and inward, and flattened to horizontal position by pressure. Neck short and cylindrical with slight broadening toward base. Shoulder nearly horizontal. Body square in horizontal section and blown into a four-sided mould which has left mould marks on the base. Base concave. Flat handle of similar glass joining rim and shoulder.

Fabric 9.

750. 24/5002 E/U Mich. 5583.

Dark green; in fragments, incomplete; enamel-like weathering leaving pits; bubbly.

D. rim 0.058 m. W. base 0.102 m. A.T. 0.004 m.

Shape as no. 749.

Fabric 9.

## 751. 26/B 4 F/E Mich. 6092.

Pale olive green; fragment of rim, neck, and handle; patches of milky weathering; very bubbly.

D. rim 0.044 m. A.T. 0.003 m.

Shape as no. 749. A piece of string for suspension was found threaded through the handle.

Fabric 9.

## 752. 26/B 2 H/YI Mich. 6078.

Green with yellow streaks; fragment of base; milky pitting in spots; very bubbly.

Side of base 0.04 m. T. in centre 0.005 m.

Base concave. Pontil technique. Moulded chequer pattern of raised ridges on under side of base.

Fabric 9.

## 753. 24/5017 B/M Mich. 5825.

Green; fragment of base; no weathering; very bubbly.

Side of base 0.04 m. A.T. side 0.002 m.

Concave base. Pontil technique. Marks of bipartite mould.

Fabric 9.

754. 24/169 AF<sup>1</sup>/T Mich. 5838.

Green; fragment of base; no weathering; very bubbly.

Side of base 0.07 m. A.T. side 0.003 m.

Concave base. Pontil technique. Two concentric raised circles on base, with dot in centre.

Fabric 9.

## 755. 28/C 37 L/D.

Base fragment as no. 754, green. Side of base c. 0.15 m. T. in centre 0.015 m.

The largest bottle base found. Fabric 9.

## 756. 24/5008 F/G Mich. 5787.

Colourless with greenish tinge; fragment of base; frosted; pin-prick bubbles.

Side of base c. 0.04 m. A.T. side 0.004 m.

Shape as no. 754. Two raised concentric circles on base.

Fabric 9 (?).

(β) *Plain-blown with flattened sides and base*

## 757. 25/278 D/F Mich. 6049.

PLS. IX and xx

Green with yellow streaks; base, two sides, and neck, rim, and shoulder, in four fragments; dirty, no weathering; very bubbly.

H. 0.088 m. W. of side at base 0.051 m. A.T. 0.001 m.

Rim outsplayed, folded upward and inward, and flattened to horizontal position by pressure. Neck short and cylindrical but broadening slightly near base. Shoulder nearly horizontal. Body almost cubical, with height of sides only slightly greater than their width. Body blown to a bulb, and then pressed to a four-sided shape, each side slightly concave. Base concave. Pontil technique. Handle of circular section joining rim and shoulder.

Fabric 9.

758. 24/5006 B/J Mich. 5876.

Greenish yellow; fragment of neck, rim, and shoulder, and fragment of base; frosted in parts; very bubbly.

Side of base 0.055 m. A.T. side 0.0015 m.

Shape as no. 757, but handle of flattened section.

Fabric 8.

759. 24/105 F Mich. 5418.

Bluish green; fragment of neck, rim, and shoulder; iridescence beginning; very bubbly.

H. neck 0.032 m. A.T. 0.001 m.

Shape as no. 757.

Fabric 8, or perhaps an importation from Syria.

760. 24/5053 B/M Mich. 5775.

Light green; fragment of neck, rim, and shoulder; no weathering; very bubbly.

H. neck 0.031 m. A.T. 0.0015 m.

Shape as no. 757.

Fabric 8.

*2. Folded rim, outward, downward, and upward*

Only two fragments are known, neither of which gives evidence of body technique.

761. 25/277 ABC/A Mich. 6047.

PL. XX

Greenish colourless; fragment of neck, rim, and handle; faint traces of iridescence; very bubbly.

D. rim 0.034 m. A.T. neck 0.002 m.

Rim vertical and folded outward, downward, and upward. Neck cylindrical, with very slight constriction at base. Shoulder sloping. Handle of triple-ribbed section joining base of rim and shoulder. Body probably rectangular.

Fabric 8.

762. 26/B 3 L/J Mich. 6086.

Pale green; fragment of neck, rim, and handle; badly strain-cracked, and frosted and iridescent in patches; very bubbly.

D. rim 0.038 m. A.T. neck 0.003 m.

Shape as no. 761.

Fabric 8.

The following example of a type of rim half-way between 1 and 2 was found:

763. 24/5028 D/H Mich. 5803.

PL. XX

Light green; fragment of neck and rim; iridescence well advanced; very bubbly.

D. rim 0.029 m. A.T. 0.002 m.

Rim slopes outward and downward at angle of  $45^\circ$ , and is then folded upward.<sup>1</sup>

Neck cylindrical. Shoulder sloping. No trace of body, which was probably rectangular. Trace of handle on lip.

Perhaps an importation from Syria.<sup>2</sup>

<sup>1</sup> If pressure had been applied from the top, the rim would be that of type 1; if pressure had been applied from the side, the rim would be that of type 2.

<sup>2</sup> Rims of this contour are common on Syrian sites.

3. *Rounded rim*

Only one fragmentary specimen occurred.<sup>1</sup>

764. 24/122 E/N Mich. 5364.

PL. XX

Yellow with greenish yellow handle; fragment of neck, rim, and handle, and fragment of base; no weathering; fairly bubbly; many black impurities.

H. c. 0.133 m. W. of side c. 0.075 m. A.T. 0.001 m.

Rim outsplayed and rounded. Cut-out in glass on under side of rim. Neck roughly cylindrical, but broadening out toward shoulder. Shoulder sloping. Body square in horizontal section and flattened on four sides by pressure after blowing. Base concave with pointed kick. Flat handle of greenish yellow glass joining rim and shoulder.

Fabric 4.

**D. UNCERTAIN FRAGMENTS, PERHAPS BELONGING  
TO SOME TYPE OF JUG OR BOTTLE**

765. 27/C 64 C/D Mich. 6211.

PL. XX

Greenish colourless; fragment of base (?); dulled and frosted; bubbly, with some impurities.

W. of side 0.086 m. A.T. 0.0015 m.

Apparently a fragment of a base of a rectangular bottle with square horizontal section. Base deeply concave. There is a raised ring on upper side (i.e., in the interior of the vessel if the fragment is from the base of a bottle) upon which are jagged marks as of post technique.

Fabric 3.

766. 27/C 59 A/H Mich. 6208.

PL. XX

Yellowish; fragment of side of bottle (?); no weathering; bubbly.

H. of fragment 0.065 m. A.T. 0.0015 m.

Fragment of very strange shape. Perhaps from the body of a bottle. Horizontal section as shown, with four rectangular indents at angles. Decoration of closely set, slanting corrugations.

Fabric 4.

<sup>1</sup> In fabric and technique it belongs rather to XI B 3, but its shape places it here.

## CLASS XII

### TWO-HANDED FLASKS AND BOTTLES

CLASS XII includes all two-handled vases which are akin in shape either to the flasks of class IX or to the bottles of class X. A few two-handled jars occurred, but they have been included in class VIII, while as yet no bowls or beakers with two handles are known from Karanis. The class is not large, apart from two important types of which numerous fragments have been found, namely globular oil-flasks (German *Delphinfläsche*), and tall-necked flasks with two small coil handles at the base of the neck. These form the first two groups. The remainder, though few in number, are too diverse for systematic treatment, and so are listed together as a third group, c.

The oil-flasks, group A, are the Egyptian representatives of a fixed and almost unchanging type used all over the Roman world. Hitherto, no complete example has been found at Karanis, but fragments are so numerous that the restoration of the type, on internal evidence alone, would have presented no difficulty. Minor variations are rare, and are confined to slight differences in the shape of the rim and body, and in decoration. With three exceptions all the fragments come from the early B-period houses of 1926, or from the houses of the beginning of the fourth century, and most of them belong either to fabric 1 or 2 or to fabric 8.<sup>1</sup> The type is early and was probably not made after the Constantinian epoch.

Numerous specimens of these oil-flasks are known from Egypt and Nubia. No less than eight complete or restorable pieces were found in graves at Karanòg, and are well illustrated in the official publication.<sup>2</sup> Other Nubian examples were found during the Oxford excavations at Faras, two of which are now in Oxford,<sup>3</sup> and during

<sup>1</sup> A few may be fabric 3, and one, which is light olive green, is perhaps fabric 4. Note that this last example was found in a top-layer house, 124 A.

<sup>2</sup> Woolley and MacIver, *Karanòg*, p. 72, pl. xxxviii. One (7350, G 292) is plain and has a flattened mouth; two (7347-8, G 135 and 355) are plain, with concave mouth; four (7353, G 339; 7357, G 648; 7358, G 88; 7359, G 114) have a concave mouth and cut decoration of facets and circles like that of no. 774; and one (7352, G 45) is the most interesting of all, for it not only has an otherwise unrecorded decoration consisting of a frieze of vertical cut lines between horizontal lines, but also has its metal bucket-handle preserved intact.

<sup>3</sup> Nos. 1912. 427 and 1913. 922, both having cut decoration, with concave mouth; *Liv. Ann.*, xi, 153, pl. xxxi, 1. A fragment of a third, with a cross-hatched frieze on the body, is illustrated on the same plate.

Reisner's excavations at Kerma,<sup>1</sup> and yet another Nubian specimen is in the British Museum.<sup>2</sup> From Egypt itself there are plain examples in the Metropolitan Museum,<sup>3</sup> and in the Arabic Section of the Kaiser Friedrich Museum,<sup>4</sup> and examples with cut decoration in the Victoria and Albert Museum (Fig. 4, 1),<sup>5</sup> in the Egyptian Museum, Berlin,<sup>6</sup> and in Cairo.<sup>7</sup>

Similar oil-flasks are found all over the Empire. They are not very common in Syria and the eastern Mediterranean, though there is an example in the Louvre from Myrina, and others are listed in the catalogue of the de Clercq collection<sup>8</sup> and in that of the Cesnola collection,<sup>9</sup> while a similar type with flattened body and mould-blown decoration, perhaps a copy of the pottery 'Menas'-flask, is also found.<sup>10</sup> But in the west specimens are innumerable, and the type varies a great deal in minor respects. The forms are given by Morin-Jean (nos. 33-6) and by Kisa (nos. B 130 and C 161-6). The majority have globular bodies with rounded or flattened bases,<sup>11</sup> or with a base ring or coil;<sup>12</sup> others have annular bodies with either plain rounded bases,<sup>13</sup> or with the addition of four pinched toes,<sup>14</sup> or flattened bodies with rounded bases.<sup>15</sup> Examples are also found with trailed-on threads or with wheel-cut or ribbed decoration,<sup>16</sup> and mould-blown in the form of a head<sup>17</sup> or of a bunch of

<sup>1</sup> Reisner, *Excav. at Kerma, Harvard African Studies*, v, 47, fig. 20; one complete, one fragmentary, both plain with concave neck.

<sup>2</sup> Bought in 1877, from Nubia; concave mouth and cut decoration, type of no. 774.

<sup>3</sup> Egyptian Department, no. 38, with concave mouth.

<sup>4</sup> No. 1694, with flattened mouth, bought in Cairo. This is a very large and heavy piece.

<sup>5</sup> No. C 339. 1928, formerly in the Wallis collection; green glass, with flattened mouth and cut decoration like no. 774, but in addition, cut facets on both the top and side of the rim.

<sup>6</sup> No. 4627, Minutoli collection; concave mouth, cut decoration as on no. 774.

<sup>7</sup> Edgar, *Cat.*, no. 32730, from Balansurah; concave mouth, cut decoration of facets and horizontal and sloping lines.

<sup>8</sup> De Ridder, nos. 548 f., p. 249, pl. xxix.

<sup>9</sup> Cesnola, *Atlas*, iii, pl. lxxxix, 2 (from Ormidia), and three other examples.

<sup>10</sup> E.g., Kisa, fig. 288; Niessen *Cat.*, no. 1026, pl. xxi.

<sup>11</sup> Morin-Jean, figs. 84, 88, 90-5; Kisa, figs. 60, 62-3; Niessen *Cat.*, no. 35 b, pl. xxii, and pl. xxxvi (several examples); Fremersdorf, *Denkmäler*, figs. 11 and 32-4; *id.*, *Röm. Gläser*, fig. 12.

<sup>12</sup> Morin-Jean, figs. 87 and 96; Kisa, fig. 61; Niessen *Cat.*, no. 475, pls. xxxvi and xl (with three handles); Fremersdorf, *Denkmäler*, fig. 35.

<sup>13</sup> Morin-Jean, figs. 97 and 99; Kisa, fig. 60.

<sup>14</sup> Morin-Jean, fig. 100; Niessen *Cat.*, no. 472, pl. xvi.

<sup>15</sup> Morin-Jean, fig. 91; Niessen *Cat.*, nos. 496-7, pl. xxxvi; Fremersdorf, *Denkmäler*, fig. 26; *id.*, *Röm. Gläser*, fig. 12.

<sup>16</sup> Morin-Jean, figs. 90 and 95; Kisa, fig. 62; Fremersdorf, *Denkmäler*, fig. 32.

<sup>17</sup> Kisa, fig. 302; Niessen *Cat.*, nos. 296, pl. xx, and 298, pl. xxi.

grapes.<sup>1</sup> It will be noticed that some of the vases mentioned have flattened rims; others have concave rims; a few have their bodies and necks divided into two compartments by a wall of glass; and a few still preserve their metal handles and stoppers.

Several other types of oil-flask with dolphin handles which are common in the west but do not seem to have occurred in the east deserve mention. The most important is the flask with a cylindrical body, and a tall neck, constricted at the base.<sup>2</sup> It is exceedingly common, and though usually plain, is also found with wheel-cut or incised decoration. Another type combines the tall neck, constricted at the base, with a spherical or a flattened body,<sup>3</sup> and a third type has a hexagonal body, sometimes with a tall neck,<sup>4</sup> at other times with a short neck and flattened rim.<sup>5</sup>

The small mouth opening in the short-necked types and the deep constriction in the tall-necked variety show that all these flasks were meant to be containers for oil. They are found in graves in connexion with objects of all periods from the first to the fourth century,<sup>6</sup> and in fabric they vary accordingly. A few of the earlier examples, more especially some of colourless glass with decoration of cut circles, may have been made in Egypt and exported to the west,<sup>7</sup> but plain types and types with trailed-on decoration were undoubtedly made in the west even as early as the first century.

The tall-necked flasks with coil handles at the base of the neck, group B, are almost uniform. They form a parallel group to the flasks, IX A, with a constriction at the base of the neck, with the exception of one fragmentary specimen which has no such constriction but is otherwise similar to them. All those listed were found either in top-layer or in Constantinian houses, and they all belong to fabric 4 or 5, so that they are of fourth-century to fifth-century date.

Some other Egyptian examples are known, all of type i. Edgar lists none, but there is an example in Cairo, no. J 45769, which was found in 1916 at Karanis, and another<sup>8</sup> in Cairo, no. J 46481, also

<sup>1</sup> Morin-Jean, fig. 221.

<sup>2</sup> Morin-Jean, form 10, pp. 56-8, figs. 32-3; Kisa, forms c 157-8, figs. 60-1; Niessen Cat., no. 415, pls. xxiii and xxxiii (seven examples); Fremersdorf, *Denkmäler*, fig. 30.

<sup>3</sup> Morin-Jean, fig. 94; Kisa, fig. 61; Niessen Cat., no. 36, pl. xxxix.

<sup>4</sup> Morin-Jean, form 18, pp. 66-8, fig. 58; Kisa, form c 159, fig. 60; Niessen Cat., no. 391, pl. xxxiii.

<sup>5</sup> Morin-Jean, figs. 56-7.

<sup>6</sup> Morin-Jean, pp. 85-6.

<sup>7</sup> E.g., one in Rouen Museum, found at Bonn, Morin-Jean, fig. 95, and another in Cologne, no. 968, illustrated by Kisa, fig. 62.

<sup>8</sup> For these two see App., p. 317.

from Karanis, is specially remarkable because it shows an ancient attempt at repair (Fig. 4, f). At some time during use the neck got broken across, and a new rim was then made by squaring off the broken edge and covering it with a coil of drawn glass. That this was not the original rim of the glass is proved by a small crack which exists in the neck in a position that it could not have acquired after the rim coil was added. The shape is just that of the vases of division i. The glass is wine-coloured, with a green rim coil and handles. Two more examples are in the Askren collection (Mich. 5162-3; see App., p. 327), and a third, of green glass with dark blue handles, is in the Kaiser Friedrich Museum, Arabic Section (no. 695).

The type is not known outside Egypt, but a rather similar shape has been found in Syria,<sup>1</sup> the only difference being that the neck is shorter and the handles reach from the rim to the shoulder: in fact, the shape is a cross between types A and B i.

The miscellaneous types listed under C are mostly of the latest period. Only one, no. 789, was found in an early house, and as it belongs to fabric 5 it must date from the latest period of occupation of that house, i.e., not earlier than the end of the third century.

The examples from other sites in Egypt are equally varied in type, apart from one important group, the cylindrical bottle-jugs with two handles. Four examples of such vases are known. Two<sup>2</sup> have horizontal wheel incisions on the body and two<sup>3</sup> have a geometrical pattern in scratched technique. Their shape is that of the fragmentary piece, no. 791. The examples with wheel incisions are of fabric 2 or 3 and probably of the third century. The others are of fabric 3 or 5, and later in date, probably fourth or fifth century. Interesting pottery copies of this shape, exact even to the cut-out in the glass below the rim, were made in painted ware by Nubian potters,<sup>4</sup> and in Tunisia.<sup>5</sup>

<sup>1</sup> De Ridder, no. 320, p. 173, pl. xiv, from Tartus. The vase is only 0.033 m. high.

<sup>2</sup> One from Karanòg, see Woolley and MacIver, *Karanòg*, 7362 (G 187), pl. xxxix, and one from Karanis in Cairo, no. J 45765; see App., p. 317.

<sup>3</sup> One found at Oxyrhynchus and now in Cairo; see Petrie, *Tombs of Courtiers*, p. 16, pl. xlvi, 9. Another is in Brooklyn.

<sup>4</sup> See, e.g., *Liv. Ann.*, xi, 151, no. liv, D, pl. xxvi, second-third century; now in Oxford, no. 1912. 320; also Woolley and MacIver, *Karanòg*, type F xxvii, pl. cv, and no. 8958, pl. xcvi.

<sup>5</sup> See *Bull. Arch.*, 1920, pp. 21 ff., for a group of vases decorated with figure subjects in relief found at El Aoudja and elsewhere in Tunisia. Another example is in the Antiquarium, Berlin; K. A. Neugebauer, *Führer durch des Antiq.*, ii, *Vasen*, p. 209, pl. 103, Inv. no. 30. 930. On all these pottery copies, though the figures are in relief, there are horizontal grooves round the body representing cuts on the glass originals.

A second group consists of vases with tall necks, ovoid or bulbous bodies, and a pad base with slanting impressions, which are parallel to the fragmentary example no. 794, though they all differ from it and among themselves in minor details of ornamentation. All belong to fabric 3, 4, or 5, and are probably of fourth-century date. Three are in Edgar's catalogue, nos. 32554-5 and 32557; three others from Karanis are in Cairo, nos. J 46482 (Fig. 4, j) and 46484 (Fig. 4, h) and no. J 47097 d in Wainwright's hoard;<sup>1</sup> one from the Fayûm is in the British Museum (bought in 1891); and one from Gizeh is in the Coptic Section of the Kaiser Friedrich Museum.<sup>2</sup> Cairo no. J 45768 (Fig. 4, k; see App., p. 317) is similar but on a stemmed base; and again similar but on a pushed-in base is a vase found at Gurob by Petrie and now in the British Museum.<sup>3</sup> Of types with concave bases similar to no. 789 there are three examples to be recorded, one in Edgar's catalogue, no. 32556; another in the Askren collection, Mich. 5161 (see App., p. 317); and a third in the British Museum from Gurob.<sup>4</sup> Not one of these can be far removed in date from the Constantinian period.

No parallels can be quoted for the coil-base vases, no. 788 and no. 792, but there are imitations of amphorae with pointed base which are not unlike no. 793 in general shape. Instead, however, of having a tallish, narrow neck, and handles from the neck to the shoulder, they have a squat, constricted neck and two circular coil handles. All three are in Cairo, two in Edgar's catalogue, nos. 32727-8, and one found later at Karanis, no. J 45776 (Fig. 4, g; see App., p. 318). They are perhaps of the third or fourth century.

Finally, a solitary specimen of a pilgrim-bottle with flattened sides and circular coil handles on the shoulder was found at Saft-el-Henneh by Petrie in a late Roman grave.<sup>5</sup>

Most of the above shapes are known in Syria and also in the west. The cylindrical bottle-jug with two handles (Morin-Jean, form 9, and Kisa, forms B 114 and C 152-3 and 156) is specially common in the west from the second century onward. Some of the examples are plain,<sup>6</sup> others are decorated with cut or scratched designs. At

<sup>1</sup> For these three see App., p. 317, and Wainwright, p. 78, type 4, pl. xxxvii.

<sup>2</sup> Wulff, no. 1208, pl. lviii.

<sup>3</sup> Bought in 1890; Petrie, *Illahun*, p. 29, pl. xxxiii, 2.

<sup>4</sup> Bought in 1890; *ibid.*, p. 29, pl. xxxiii, 6.

<sup>5</sup> Petrie, *Hyksos*, p. 41, pl. xxxviii A (grave 725).

<sup>6</sup> E.g., Morin-Jean, fig. 28; Kisa, fig. 39; Niessen Cat., nos. 416-22, pls. xxxiv and xlvi; Fremersdorf, *Denkmäler*, fig. 34; Boulanger, *Mobilier funéraire*, pl. xi (from the Chieftain's tomb, Monceau-le-Neuf, mid-fourth century).

Hohensulzen near Worms in two sarcophagi an important find of several vases of this type was made: in the first sarcophagus was a vase of this type with a Bacchic scene in finely cut technique which can hardly have been manufactured after the second century, and of which the fabric, no less than the technique, points to an Alexandrian origin; and also a vase of similar shape with geometrical scratched decoration.<sup>1</sup> In the second sarcophagus were three more two-handled bottle-jugs with scratched decoration, one of them in a very fragmentary state.<sup>2</sup> All these vases except the first are directly parallel in fabric and technique to the specimen found by Petrie at Oxyrhynchus and to the one-handled examples listed under XI B 3 (β) and they must have been made under Egyptian influence if not actually in Egypt. The date of the burials in which they were found is quite consonant with the date of the Egyptian specimens, for the earliest occurrence of inhumation-burial in the west in Roman times is in the later third century. Another fine example of this type with scratched decoration has been found at Cologne,<sup>3</sup> and a similar bottle-jug but with decoration of horizontal wheel incisions only is in Bonn (no. 15312). This variety with wheel incisions is also found in Syria,<sup>4</sup> but the more elaborately decorated type does not seem to occur there.

Apart from the cylindrical oil-flask with dolphin handles already mentioned under group A, the only other type of cylindrical bottle-jug which is at all common is the *barillet* (Morin-Jean, form 132; Kisa, forms B 154-5 and 160). This, though not found in either Egypt or Syria, is very common in the west. It occurs also in a one-handled variety.<sup>5</sup>

Bulbous amphorae with tall necks and pad bases occur in Syria,<sup>6</sup> but do not seem to be known on western sites: types with stemmed bases are, however, found both in Syria<sup>7</sup> and in the west,<sup>8</sup> while pushed-in and tubular bases<sup>9</sup> are far commoner than either pads or

<sup>1</sup> Both now in Mayence; G. Behrens, *Röm. Gläs. aus Deutschland*, p. 22, figs. 12-13. In the same sarcophagus were fragments of a *diatretum* (now in Mayence and Bonn) and a fusiform toilet-bottle (now in Bonn).

<sup>2</sup> These are now in Bonn; Lehner, *Führer*, i<sup>2</sup>, 79. For both groups see *Bonner Jahrbücher*, lix, 64 ff., pls. ii-v.

<sup>3</sup> Now in Cologne, no. 25. 480; Fremersdorf, *Denkmäler*, fig. 40, and *id.*, *Röm. Gläser*, p. 11, fig. 33. <sup>4</sup> E.g., Oxford, no. 1912. 143, bought in Beirut.

<sup>5</sup> See p. 237 above and references there.

<sup>6</sup> E.g., *Niessen Cat.*, no. 1003, pl. lii.

<sup>7</sup> E.g., *ibid.*, no. 1016, pl. lii.

<sup>8</sup> E.g., Kisa, forms C 132, 136, and 150, figs. 80 and 120 (= pl. v), and Morin-Jean, fig. 302.

<sup>9</sup> The types are very varied: see, for western examples, Morin-Jean, form 42,

stems, contrary to what is the case in Egypt. The same shapes often occur with concave or rounded bases.<sup>1</sup>

Amphorae with pointed bases are common in both the west and east. Some have a coil of glass at the point which renders them not far removed from no. 788 in general shape. There is a Syrian example of this type in Philadelphia (case xiv, 178), and another in the British Museum.<sup>2</sup> Others end in a plain point and are more nearly akin to no. 793. Eastern examples may be seen in the Niessen collection,<sup>3</sup> in Oxford,<sup>4</sup> in the British Museum,<sup>5</sup> and (most nearly allied of all to the Karanis piece) one in the de Clercq collection;<sup>6</sup> western examples are illustrated by Kisa,<sup>7</sup> by Morin-Jean,<sup>8</sup> and in the Niessen collection.<sup>9</sup> Quite recently an example of the same shape with geometrical decoration in scratched technique on the body has been acquired by the Mayence Museum.<sup>10</sup>

Flat-sided pilgrim-flasks like the one found by Petrie at Saft-el-Henneh occur also outside Egypt.<sup>11</sup>

There are two other varieties of two-handled vases whose non-occurrence on Egyptian sites up to the present is probably only accidental. One of these is the two-handled rectangular bottle of heavy green glass, parallel in all respects but its second handle to the one-handled type of XI c.<sup>12</sup> The other is a group of vases whose bodies are mould-blown in the shape of shells or grape-clusters.<sup>13</sup>

figs. 112-13, 336, 344; Kisa, forms B 115, 117-20, 123-5, 127-8, C 135, 138-9, 141, 156, figs. 95, 138, 160 g, 239 a, 322: and for eastern, *Niessen Cat.*, no. 1001, pl. li; Philadelphia, case xvi, 171; Cesnola, *Atlas*, iii, pl. lxxxix, 1 and 3-6.

<sup>1</sup> See, e.g., Kisa, forms B 121, 126, 129, C 131, 133-4, 137, 140, 142, figs. 95-6 and 162; Morin-Jean, fig. 69. Of these the shape nearest akin to no. 789 is Kisa's form B 129, fig. 95.

<sup>2</sup> From Mt. Carmel, bought in 1895.

<sup>3</sup> *Niessen Cat.*, no. 1007, pls. li and lli, and 1011, pls. xvii and lli.

<sup>4</sup> Nos. 1912, 135 and 1046, both from Syria.

<sup>5</sup> An example bought with the Towneley collection and probably from the eastern Mediterranean.

<sup>6</sup> De Ridder, no. 327, p. 175, pl. xiv, from Umrit.

<sup>7</sup> Kisa, forms B 111-13 and 122, figs. 67 and 99.

<sup>8</sup> Morin-Jean, form 29, fig. 80.

<sup>9</sup> *Niessen Cat.*, nos. 331, pl. xxxv, and 32, pl. xlvi.

<sup>10</sup> *Mainzer Zeitschrift*, xxvi, 103, pl. vi. The vase forms a direct parallel in all but its pointed base to the cylindrical bottle-jugs, p. 256 f. above.

<sup>11</sup> E.g., from Syria, de Ridder, no. 545, p. 248, pl. xxviii, and parallel examples quoted *ad loc.*; and, from western sites, Morin-Jean, form 43, figs. 115-16, and *Niessen Cat.*, no. 470, pl. xvi.

<sup>12</sup> For examples see Morin-Jean, form 16, figs. 48-50, and *Niessen Cat.*, no. 354, pl. xxxv.

<sup>13</sup> See, e.g., Morin-Jean, form 131, figs. 218-20 and 222; Kisa, figs. 46, 48, 309-10, and 312; *Niessen Cat.*, no. 314, pl. xxxvii.

## SKELETON CLASSIFICATION

- A. Oil-flasks with globular bodies and small ring handles (*Delphinfläsche*)
- B. Tall-necked flasks with two coil handles at the base of the neck
  - i. With constriction at base of neck
  - ii. Without constriction at base of neck
- C. Miscellaneous types

**A. OIL-FLASKS WITH GLOBULAR BODIES AND  
SMALL RING HANDLES (*Delphinfläsche*)<sup>1</sup>**

No complete pieces were found, but fragments, chiefly of rims and necks, were very numerous, and only a representative selection is listed. The type is uniform and the only differences in shape are that the rims may be concave or flat and the bodies ovoid or globular. In addition, the body may be plain or decorated with cut patterns and the handles may be of similar glass or of a second colour. In view of the fragmentary nature of the specimens it has not been deemed advisable to subdivide on the basis of these minor differences.

**767. 24/5006 A/AA** Mich. 5841.

PL. XX

Colourless with greenish tinge; fragment comprising neck, rim, and handles; no weathering; fairly free from bubbles; streaks of stone.

D. rim 0.043 m. A.T. 0.002 m.

Rim well outsplayed and folded upward and inward, leaving a very small mouth opening; the mouth is pressed in on top to a very deep concavity. Neck cylindrical. Shoulder sloping. Body globular. Handles made of a thick coil of similar glass and set in the hollow between the rim and the shoulder. The coil is so folded as to leave a small circular opening through which a metal bucket-handle was originally threaded.

Fabric 1 or 2.

**768. 25/5079 C/A** Mich. 6069.

Colourless with greenish tinge; fragment comprising neck, rim, and handles; frosted; some bubbles.

D. rim 0.041 m. A.T. 0.002 m.

Shape as no. 767.

Fabric 1 or 2.

**769. 24/4034 A/AE** Mich. 5883.

Colourless with greenish tinge; fragment comprising neck, rim, and handles; traces of iridescence; some bubbles.

D. rim 0.04 m. A.T. 0.0025 m.

Shape as no. 767.

Fabric 2 or 3 (?).

<sup>1</sup> The glass handles have something of the appearance of a dolphin, head downward, with coiled tail, hence the German name.

770. 25/5085 D/C Mich. 6073.

Greenish colourless; fragment comprising neck, rim, and handles; no weathering; many bubbles.

D. rim 0.046 m. A.T. 0.0025 m.

Shape as no. 767.

Fabric 3 (?).

771. 24/142 A/H Mich. 5438.

Light olive green; fragment comprising neck, rim, and handles; no weathering; pin-prick bubbles; some black impurities.

D. rim 0.043 m. A.T. 0.0025 m.

Shape as no. 767.

Fabric 4 (?).

772. 24/5006 A/AA Mich. 5841.

Bluish green; fragment comprising neck, rim, and handles; milky-pitting weathering in patches; bubbly.

D. rim 0.035 m. A.T. 0.002 m.

Shape as no. 767.

Fabric 8.

773. 26/B 3 E/U Mich. 6085.

PL. XX

Colourless with greenish tinge; fragment comprising neck, rim, and handles; no weathering; material good; few bubbles.

D. rim 0.044 m. A.T. 0.003 m.

Shape as no. 767, but rim flat and horizontal.

Fabric 2.

774. 26/B 9 E/O Mich. 6102.

PL. XX

Colourless with greenish tinge; fragment of body; frosted; many pin-prick bubbles.

D. body 0.092 m. A.T. 0.005 m.

Globular body with flattened base. Cut decoration: on shoulder, a horizontal row of broad oval facets with narrower oval facets in interstices below; between these and the main frieze, a broad horizontal line; on body, the main frieze consisting of four large circles each with a circular facet in the centre; on the base, a large oval facet; in the field between this and the main frieze, other small oval facets.

Fabric 2 or 3.

775. 25/5085 D/C Mich. 6073.

Colourless with greenish tinge; fragment of side and bottom of body; frosted; many pin-prick bubbles.

D. body c. 0.10 m. A.T. 0.006 m.

Body globular with rounded base. Cut decoration: round the body, a horizontal frieze of circles each with a circular facet in the centre; between each pair of circles, two circular facets joined by a vertical line; on base, a circular facet surrounded by five small oval facets, all within a circle.

Fabric 2 or 3.

776. 25/5085 B/F Mich. 6072.

Colourless with greenish tinge; fragment of body; frosted; some pin-prick bubbles. A.T. 0.0035 m.

Body globular, base missing. Cut decoration similar to that of no. 775.

Fabric 2.

**777.** 24/5012 F/I Mich. 5849.

Colourless with greenish tinge; fragment of body; no weathering; pin-prick bubbles.  
A.T. 0.007 m.

Globular body with parts of five large, circular, cut facets.

Fabric 2 (?).

**778.** 26/B 17 F/N Mich. 6112.

Colourless with greenish tinge; fragment of body; no weathering; pin-prick bubbles.  
A.T. 0.0025 m.

Body globular with decoration of cut facets within circles.

Fabric 2.

**779.** 27/C 53 F<sup>1</sup>/T Mich. 6191.

PL. XX

Greenish colourless; fragment of body; no weathering; material bad; very bubbly,  
with many impurities and spiral streaks of stone.

D. body 0.064 m. A.T. 0.002 m.

Body globular with flattened sides. Base concave with slight kick. No decoration.  
Fabric 8.

**780.** 24/5028 D/H Mich. 5803.

PL. XX<sup>1</sup>

Colourless with light turquoise blue handles; fragmentary, most of body missing;  
no weathering; few bubbles; some particles of unfused sand.

H. 0.034 m. D. 0.029 m. A.T. 0.0005 m.

Rim outplayed and folded upward and inward, and flattened to horizontal position  
by pressure. Neck cylindrical. Shoulder sloping. Body globular. Base concave  
with slight kick. Pontil technique. Two coil handles of same type as on no. 767 in  
hollow between rim and shoulder.

Fabric 2.

**781.** 26/B 1 C/H Mich. 6077.

Colourless with greyish tinge, opaque light blue handles; fragment comprising neck,  
rim, and handle; strain cracks; few bubbles.

D. rim 0.025 m. A.T. 0.001 m.

Shape as no. 780, but slightly larger.

Fabric 2.

**782.** 24/136 L/B Mich. 5847.

Colourless with greenish tinge, light blue handles; fragment comprising neck, rim,  
and handles; no weathering; few bubbles.

D. rim 0.02 m. A.T. 0.0005 m.

Shape as no. 780.

Fabric 2.

## B. TALL-NECKED FLASKS WITH TWO COIL HANDLES AT BASE OF NECK

Apart from the pieces listed many smaller fragments must have  
occurred, but in the absence of any trace of handles they would be

<sup>1</sup> Very small examples like this and the two following fragments are occasionally  
found in the west. One minute specimen, only 0.015 m. high, of colourless glass with  
green handles, is in St. Germain; see Morin-Jean, p. 85, note 2.

indistinguishable from fragments of flasks of a similar shape. There are two variations of the type, one with and one without a constriction at the base of the neck, but of the latter only one fragmentary specimen was found.

I. *WITH CONSTRICKTION AT BASE OF NECK*

783. 25/293 A/A Mich. 5584.

PLS. X and xx

Light yellowish brown; crack in body; contents stain, slight traces of iridescence; some bubbles; black impurities.

H. 0.142 m. D. body 0.096 m. A.T. neck 0.002 m.

Rim well outsplayed and folded upward and inward. Neck tall and cylindrical with constriction at base. Body globular. Base concave with flat-edged reamer mark. Pontil technique. Thread of glass trailed on spirally from under side of rim to near base of neck; outside this, two long threads coiled into round handles at base of neck, and ending at rim in a thin tail. Both spiral and handles of similar glass. Fabric 4.

784. 27/209 C/K Mich. 5945.

Brown, with green handles and coil; tails of handles missing; brown contents stain and usage scratches, no weathering; bubbly; many impurities, chiefly in coils.

H. 0.14 m. G.D. body 0.093 m. A.T. neck 0.003 m.

Shape as no. 783, but sides of body flat and greatest diameter at shoulder. Pointed kick in base. Beneath rim a thickish coil of glass in four spiral revolutions. Both coil and handles of green glass.

Fabric 5.

785. 25/253 G/N Not retained.

Brown; in many fragments, incomplete; no weathering; bubbly.

H. c. 0.145 m. D. body c. 0.09 m. A.T. 0.0015 m.

Shape as no. 783. No coil or thread on neck.

Fabric 5.

786. 27/C 56 G/F Mich. 6201.

Brown; in many fragments, nearly complete; no weathering; bubbly.

H. c. 0.16 m. D. body c. 0.09 m. A.T. 0.0015 m.

Shape as no. 783, but constriction at base of neck very slight. Spiral coil on neck.

Fabric 5.

II. *WITHOUT CONSTRICKTION AT BASE OF NECK*

787. 25/252 E/A Mich. 6040.

PL. XX

Yellow with green handles; fragment of neck, rim, and shoulder; no weathering; many bubbles; black impurities.

H. neck 0.07 m. A.T. 0.001 m.

Rim outsplayed and folded upward and inward and pressed flat on top. Neck cylindrical without constriction at base. Shoulder sloping. Body globular (?).

Two long threads, green, forming handles with round openings at base of neck, and ending in a thin tail on rim.

Fabric 4.

## C. MISCELLANEOUS TYPES

Under this head are grouped all the remaining examples of two-handled flasks. Some are complete, some fragmentary, and all are of very diverse types.

**788.** 27/c 56 G/MI Cairo J 52756. PLS. X and XX

Greenish yellow; small crack near base; contents stain and usage scratches, no weathering; bubbly; black impurities; blowing spirals.

H. 0.189 m. G.D. body 0.064 m. A.T. neck 0.002 m.

Technique of rim doubtful.<sup>1</sup> Neck tallish, with upward taper. Sloping shoulder. Tall, narrow, ovoid body with greatest diameter at junction of sides and shoulder. Sides taper downward in slightly convex curve. Solid base coil of similar glass with pontil technique and slight kick below. Two handles of similar glass, circular in section, from rim to centre of neck and thence in deep bow to shoulder, asymmetrical one with the other.

Fabric 5.

**789.** 26/B 20 G/A Cairo J 51407. PLS. X and XX

Dull green, streaked with grey; intact; no weathering; bubbly; many impurities.

H. 0.055 m. D. body 0.039 m. A.T. 0.001 m.

Rim outsplayed and folded upward and inward. Neck short and deeply concave. Shoulder sloping. Body ovoid with convex sides, angular junction of sides and shoulder. Base concave with deep kick. Pontil technique. Coil of similar glass underneath rim and two flat handles, also similar, from top of neck to shoulder.

Fabric 5.

**790.** 25/276 A/G Mich. 6046. PL. XX

Greenish colourless; neck, rim, handles, and part of body in many small fragments; no weathering; pin-prick bubbles.

D. rim 0.067 m. A.T. 0.0005 m.

Rim well outsplayed, and rounded at edge. Neck short and concave. Shoulder sloping. Body bulbous, no trace of base. Thin coil of similar glass below rim. Two handles, also of similar glass, circular in section, from rim to top of neck and thence in deep curve to shoulder.

Fabric 3.

**791.** 24/5012 M/D Mich. 5878.

Yellowish green; neck, handle, and part of body; no weathering; bubbly.

D. body 0.056 m. A.T. 0.0015 m.

Rim missing. Neck cylindrical. Shoulder horizontal. Body cylindrical. Slight roll in glass at junction of shoulder and body. Two-ribbed handles of similar glass joining top of neck with shoulder.

Fabric 5.

**792.** 24/152 H/C Mich. 5586. PLS. X and XX

Pale blue, with greenish blue handles and coil; rim missing; no weathering; pin-prick bubbles; few impurities.

H. as extant 0.077 m. D. body 0.042 m. A.T. 0.001 m.

<sup>1</sup> Either there is an added coil of similar glass at the edge, or the rim has been folded upward and inward. The working is, in either case, bad and uneven.

Rim missing. Neck tallish and cylindrical, with gentle curve between neck and body. Shoulder sloping. Body bulbous with greatest diameter at middle. Solid coil of greenish blue glass on base. No pontil technique. Two handles, also greenish blue, each starting in a circular ring at the base of the neck and reaching to rim in a thin tail pinched horizontally at intervals.

Perhaps fabric 7, but a lighter blue than usual.

**793.** 24/5006 B/A Mich. 5585.

PLS. X and XX

Olive green; intact; usage scratches, no weathering; very bubbly; few impurities. H. 0.132 m. G.D. body 0.058 m. A.T. 0.0015 m.

Rim well outsplayed horizontally, and folded upward and inward. Neck short and cylindrical. Shoulder horizontal. Body ovoid with greatest diameter at junction of sides and shoulder. Sides convex, tapering downward. Long, solid-pointed base. Two handles, circular in section and of similar glass, joining middle of neck to middle of shoulder in a right-angled curve.

Fabric 5.

**794.** 27/B 118 J/E<sup>1</sup> Mich. 6164.

Greenish yellow, with green handle; fragments of rim, handle, and base ring, and many body fragments, incomplete; no weathering; bubbly.

H. c. 0.16 m. D. base ring 0.07 m. D. rim c. 0.10 m. A.T. 0.001 m.

Rim well outsplayed at an angle of 45° and folded upward and inward. Neck cylindrical, joining shoulder in gentle curve. Shoulder sloping. Body globular. True base ring, high and outsplayed, with faint fashioning marks on exterior. Base convex. Pontil technique. Two<sup>1</sup> green handles, circular in section, joining middle of neck and shoulder in right-angled curve.

Fabric 5.

**795.** 24/5016 B/L Mich. 5778.

Green with purple streaks, bluish green handles and coil; fragment of rim and neck; no weathering; very bubbly.

D. rim 0.03 m. A.T. 0.0015 m.

Rim outsplayed, and folded upward and inward. Neck cylindrical. No trace of body.

Circular coil half-way up neck from which sprang two handles of uncertain shape. Fabric 5.

**796.** 24/136 F/F Mich. 5882.

PL. XX

Dark blue; fragment of neck, rim, and shoulder; no weathering; full of bubbles.

D. rim 0.02 m. A.T. 0.001 m.

Rim vertical, rounded, and thickened. Neck cylindrical with slightly concave sides.

Shoulder sloping, body uncertain. Two thin handles, circular in section and of similar glass, joining middle of neck with shoulder.

Fabric 7, but of a texture more akin to fabric 8 than to the table wares.

<sup>1</sup> Only one handle is extant, but to judge from the shape of the vase it must have been originally two-handled.

## CLASS XIII

### TOILET - BOTTLES

THE *unguentarium*, or, better, toilet-bottle (for the Latin word *unguentarium* seems to be of comparatively modern invention), is the most widespread and constant of all the shapes of Roman glass. It is found all over the Roman Empire and at all dates from the first century A.D. to the fifth or even later, and its general type always remains the same—a vase with tall, cylindrical neck surmounting a more or less spreading body. At Karanis complete specimens were not found so commonly as their solidity and durability might lead one to expect, but fragments were recorded constantly at all levels.

Seven main varieties may be distinguished. Some of them are as yet only represented by fragments, but they can all be restored with the aid of complete examples found on other Romano-Egyptian sites.

Type A is a tall bottle with a triangular body, the height of the body being about one-third of the total height of the vase. Most usually the body is hollow and the walls of both body and neck are fairly thin; not a few fragments, however, and one nearly complete specimen have an almost solid body and comparatively thick walls on the neck. A very large proportion of the fragments belong to fabric 9, but one or two are of a finer and thinner fabric, though still very bubbly, and should probably be ascribed to fabric 8. One fragmentary specimen, no. 802, is of very bubbly, colourless glass, perhaps a colourless variety of fabric 9. Fragments of this type were found in all layers though they are rare in the latest houses; its manufacture must have continued unchanged from the second to the fourth century.

Type B, which is only represented so far by fragments, is similar in shape to the preceding type, but the height of the body is about one-half of the total height of the vase. All the examples have hollow bodies, and the type is unvarying, save in fabric and decoration. Most of the examples belong to better wares than fabric 8 or 9, and are usually decorated with some kind of marvered-in threads. One, no. 814, seems to be modelled in sand-core technique, others are almost certainly fabric 1 or 2 with opaque white threads: the rest are doubtful. Not one comes from a top-layer house and one or two

were found in B-period houses of 1926: thus all indications suggest that the type was early and probably not manufactured after the third century.

Type C, again, has a triangular body, but the vase is squat and the diameter of the base is more than one-half the total height. All the examples are uniform, and all are of fabric 9. Of the four complete specimens listed, two come from B-period houses of 1926 (though not from the earliest), and the other two are stray finds: as the fragments also come chiefly from early houses, there can be no doubt that this type, like the foregoing, ceased to be manufactured in the third century.

Type D, which is rare, is distinct from all the others in having a rounded body instead of a straight-sided one. The height of the body is small in proportion to the total height of the vase. All four listed examples are of fabric 9 and all come from early rather than late houses, so that we are here also dealing with an early type.

Type E, probably the commonest of all, is also the most poorly made, in both composition and technique. In it there is no distinction between neck and body, but only a slight broadening of the neck where it joins the base. Two variants occur, one with a solid base and one with a hollow one, parallel to the two variants in type A, except that here the solid bases are predominant while in A they are in a minority. The proportion of height to diameter varies considerably. Without exception these vases belong to fabric 9. Though they have been found in houses of all levels, they become commoner in later houses. The shape is degenerate, the ware is bad, even for fabric 9, and the technique is careless: that they are mostly late cannot be doubted.

Type F, which is not common, consists of tall and narrow vases with a distinct modelling mark about one-third of the way up dividing the body from the neck. The vases are well made and symmetrical, and the type is constant, except that the base may be either flat or rounded. They belong either to fabric 5 or to fabric 9, and as fragments do not seem to occur in the earliest houses and are rare in the latest, the type should probably be dated to the third and fourth centuries.

Of type G only two fragmentary specimens have so far been found, both of fabric 9. The shape, which is known from a complete example in Cairo,<sup>1</sup> is in essence little more than a tube with a rounded

<sup>1</sup> Edgar, *Cat.*, no. 32690.

end. To judge from the position of the two fragments discovered, the type is not early. Very similar vases are common in early Arab times.<sup>1</sup>

The vases of type H, though allied in shape to both A and E—they are, in fact, a cross between the two—are unlike the preceding types in having walls which rarely exceed one millimetre in thickness. Their necks are tall and the bodies vary from a distinctly triangular shape to a flattened form with rounded edges. All belong to fabric 8. Most of them come from the B-period houses of 1926 and none has yet been found in a top-layer house, so that they must belong to the second and third centuries.

Of these eight types, therefore, B, C, D, and H belong only to the early period; F and G are intermediate in date; E is chiefly, if not entirely, late; and A seems to have been current from the second to the fourth centuries.

Complete specimens of all the above appear in other Egyptian collections. They do not vary in shape and technique from the Karanis types, and a detailed account of them is therefore unnecessary.<sup>2</sup> A few other types, however, occur which, so far, are not

<sup>1</sup> E.g., Edgar, *Cat.*, nos. 32726 and 32798–9 (found at Mit Rahineh with Arabic MSS., see *ibid.*, p. v); Petrie, *Memphis*, p. 15, pl. li, 25 (from Athribis); and Askren collection, Mich. 5258–9; see App., p. 329.

<sup>2</sup> It will suffice to give a list of those noted:

- A. Edgar, *Cat.*, nos. 32629–31, 32636–8, and 32651–3. Nos. 32632–3 are of the same type, but have very flat bodies and look like Syrian pieces, type (c), p. 270 below. Askren collection, Mich. 5166–72; see App., p. 328.  
Toronto, G 1847, 1930, and 1954.  
British Museum, Franks, 1878; and also Egyptian Department, 4750, 4755, 4757, and 36284.  
Boston, 13. 4026–7 (from Kerma); Reisner, *Excav. at Kerma, Harvard African Studies*, v, 47.  
Brussels, E 599 (from Sediment).  
Petrie, *Hawara*, pl. xx, 16–17 (the latter of opaque blue glass) = *id.*, *Daily Use*, pl. iv, 576–7.  
Quibell, *Saqqara*, i, 30, pl. xxxiv, two examples.  
Woolley and MacIver, *Karanòg*, nos. 7342 (G 314) and 7355 (G 281), pl. xxxvii.
- B. Edgar, *Cat.*, nos. 32634–5, 32640–50, 32654, and 32655–62 (eight examples, all wrapped in papyrus covers).  
Askren collection, Mich. 5173–5 (no. 5174 is early glass, olive green with opaque white trailed threads, marvered in and blown with the vase); see App., p. 328.  
British Museum, Egyptian Department, 56837.  
Brussels, E 6724.  
*Liv. Ann.*, xi, 153, pl. xxxi, 111 g, h (from Faras).
- C. 1. Heavy ware (as the Karanis specimens):  
Edgar, *Cat.*, nos. 32663–6.  
Askren collection, Mich. 5176–82; see App., p. 328.

*Note continued on next page.*

represented at Karanis. One has a bulbous body horizontally constricted round the middle, giving the sides of the body a doubly convex contour, and is represented by six examples in Edgar (nos. 32622-7). As this type is very common in Syria (p. 270, type (e)), it is possible that these are actual Syrian pieces imported either in antiquity or else by modern dealers. Not one has a definite Egyptian provenance attached to it. To a second type belong four vases in Edgar (nos. 32691-4) and one in Toronto (G 1835), which have roughly the shape of a pipette with a biconical or bulbous widening in the centre of a tubular body. The rim is plain or folded, and at the bottom of the vase there is usually a slight bulb. These also

*Note continued from previous page.*

Toronto, G 3891-2 (from the Fayûm).

British Museum, Egyptian Department, 58579.

*Liv. Ann.*, xi, 153, pl. xxxi, III a (from Faras).

2. Light ware (type with outsplayed but unfolded rim, thin walls, and hollow body, as yet unknown at Karanis):

Edgar, *Cat.*, nos. 32697-8.

Victoria and Albert Museum, 375. 1900 (Myers collection).

Boston, 04. 1922 (from Akhmim) and 24. 895 (from Meroe, N XVI A).

D. Edgar, *Cat.*, nos. 32612-21 and 32639.

Askren collection, Mich. 5183-6; see App., p. 328.

Toronto, G 1837.

Boston, 04. 1927 (from Gurneh).

British Museum, Egyptian Department, 4748, 4754, 4756, and 4758-9.

Kaiser Friedrich Museum, Coptic Section, Wulff, no. 1216.

Petrie, *Roman Portraits*, p. 20, pl. xiv, two examples (now in Edinburgh, nos. 1911. 210. 4 f, h).

E. i.

Edgar, *Cat.*, nos. 32677-81.

Askren collection, Mich. 5187-99; see App., pp. 328-9.

Toronto, G 3886-7, 3894-5, and 3897 (all from the Fayûm).

Brussels, E 1049 (from Oxyrhynchus, 1904-5) and E 6725.

Petrie, *Hawara*, pl. xix, 10-11 (= *id.*, *Daily Use*, pl. liv, 534 and 533 resp.), and p. 11, pl. xx, 3 (two examples).

ii.

Askren collection, Mich. 5250-1; see App., p. 329.

F. Edgar, *Cat.*, 32667-76 and 32682-9.

Askren collection, Mich. 5200-6 and 5252-7; see App., p. 329.

Toronto, G 3884 and 3896 (both from the Fayûm).

Brussels, E 6723.

The Oriental Institute, the University of Chicago, one example.

Boston, 04. 1928-30 (from Gurneh), 24. 894 (from Meroe, W 148), and 13. 4293.

British Museum, Egyptian Department, 4752 and 36285.

*Liv. Ann.*, xi, 153, pl. xxxi, III b-f and i.

G. See pp. 266-7 and notes.

H. Askren collection, Mich. 5249; see App., p. 329.

Wainwright, no. J 47098 f, type 11, p. 85, pl. xxxvii.

Petrie collection. Univ. College, London (from Hawara), one example.

may be imports from Syria, for the shape is far commoner in Syria (p. 270, type (f)). Two further specimens in Edgar are in the form of a tapering tube with plain lip, and have a small hole at the base as well. A fourth type is not unlike form c, but the neck is funnel-shaped instead of cylindrical; Edgar no. 32699, from Hawara, is the only example so far known. Finally, there is a small bottle in the Karanis hoard published by Wainwright<sup>1</sup> which is more like a Syrian or a western piece, having an unworked rim, slightly outsplayed, a neck tapering upward, and a drop-shaped body. Perhaps it is an imported vase; a shape not unlike it occurred at Gurob in a late layer.<sup>2</sup>

Toilet-bottles of some of the above types, and of Egyptian material and fabric, have been found in other parts of the eastern Mediterranean, but, with the exception of early specimens of type B in variegated and other fine glassware, they do not seem to have penetrated to more western lands. In comparison, however, with the numbers of bluish green Syrian pieces that occur in other countries, these exported Egyptian pieces are few and far between, even in south Russia, where the largest number of them has been found. Among exported types, A<sup>3</sup> and B<sup>4</sup> are predominant; E<sup>5</sup> is fairly common, at any rate in Cyprus; and of the remaining shapes few certain instances are known.<sup>6</sup> The examples of A and B which occur seem from the evidence of the Karanis finds to be early instances of their respective shapes, so that, despite the frequency of type E (a late type) in Cyprus, it would appear that the export of Egyptian toilet-bottles was more prevalent in the early Imperial period.

The full treatment of the parallel types of toilet-bottle of non-Egyptian origin is beyond the scope of this work. In Syria the types,

<sup>1</sup> Wainwright, no. J 47095 d, type 13, p. 85, pl. xxxvii.

<sup>2</sup> Petrie, *Illahun*, p. 29, pl. xxxiii, 12.

<sup>3</sup> Numerous examples from Kerch are in the Louvre and in Oxford, and others in the Louvre are from Myrina; a fragmentary specimen from Warka in Iraq is published by J. Jordan, *Uruk-Warka* (1928), p. 70, pl. 99, i. See also Cesnola, *Atlas*, iii, pl. ci, 3 (from Idalium), and *Mon. Antichi*, xi, fig. 96 (from Likutsina, Crete).

<sup>4</sup> A plain example from Corfu is in the British Museum (Woodhouse bequest, 1868), and another in the same museum is from Kerch (Capt. Giffard, 1856). Of variegated glass there is in Avignon an example from Piolenc, and one in the British Museum is from Cologne (bought, Slade bequest, 1871). See also Cesnola, *Atlas*, iii, pl. lxxvii, 4, 11, 13, and pl. cv, 5 for four plain examples, all from Idalium.

<sup>5</sup> An example from Cnidus is in the British Museum (Newton excavations, 1859). There are fifteen examples from Cyprus in the Cesnola collection; *Atlas*, iii, pl. lxxvii, 2.

<sup>6</sup> Of type D, two examples are in the Cesnola collection; *Atlas*, iii, pl. lxxvii, 6, 10 (both from Idalium); another example, also from Cyprus, is in the de Clercq collection; de Ridder, no. 462, p. 222, pl. xxiii. Of type F there are three examples in the Cesnola collection from Idalium; *Atlas*, iii, pl. lxxvii, 7-9.

though very diverse, tend to divide themselves into seven main groups:

- (a) Small bottles with narrow, drop-shaped body, cylindrical neck with mark of modelling tool at its base, and unworked or rounded rim—not unlike a small variety of the Egyptian type B.<sup>1</sup>
- (b) Tall-necked bottles with spreading base, but no distinction between neck and body. Folded rim. General shape of Egyptian type E, but much earlier in date.<sup>2</sup>
- (c) Very tall-necked bottles with triangular body, often exceedingly flat, and constriction or at least a mark of a modelling tool at the base of the neck. Rounded or folded rim. General shape of Egyptian type A.<sup>3</sup>
- (d) Heavy bottles with piriform body, usually convex-sided, and cylindrical neck, the neck and body being more or less equal in height. Folded and flattened rim.<sup>4</sup>
- (e) Tall-necked bottles with constriction at base of neck and a spreading body also constricted horizontally round middle, compare Edgar, 32622-7.<sup>5</sup>
- (f) Fusiform or 'pipette' type, as Edgar, 32691-4, which pieces, as suggested above (p. 268 f.), are probably Syrian.<sup>6</sup>
- (g) Drop-shaped bottles with concave neck and folded rim, decorated with trailed-on threads and often with a basket-handle as well. Double examples of this type are as common as, if not commoner than, single ones. The type does not occur much before the fourth century.<sup>7</sup>

The types have been arranged in rough order of the date of their first appearance. The first four and perhaps the fifth are all found at least as early as the second century, and probably even in the first. The last two seem to begin in the third century.

The same types with the exception of (g) are prevalent in the west, and each seems there to be roughly contemporary with its eastern counterpart.<sup>8</sup>

<sup>1</sup> E.g., Dragendorff, *Thera*, ii, 286-7, fig. 481 a, b.

<sup>2</sup> E.g., *Fouilles de Delphes*, v, 215-16; Cesnola, *Salaminia*, pl. xviii, 6; Victoria and Albert Museum, no. C 51-1927 (Lord Howard de Walden collection).

<sup>3</sup> E.g., Cesnola, *Atlas*, iii, pls. cii, 1-4, all from Idalium; de Ridder, nos. 409 ff., p. 209, pl. xxii; Dragendorff, *Thera*, ii, 286-7, fig. 481 g, h; Froehner, *Gréau Cat.*, nos. 1422-3, 1426, pl. ccliii, 4, 5, 8, all from Cyprus.

<sup>4</sup> E.g., Cesnola, *Atlas*, iii, pls. xcix, c, and ci (1-2), all from Idalium; Dragendorff, *Thera*, ii, 287, fig. 481 d, e; *Fouilles de Delphes*, v, 215-16.

<sup>5</sup> E.g., Cesnola, *Atlas*, iii, pl. cv, 1 from Idalium, and four others; de Ridder, no. 587, p. 263, pl. xxx.

<sup>6</sup> E.g., Cesnola, *Atlas*, iii, pl. cv, 2 and 7 (from Idalium), and numerous others; de Ridder, nos. 582-6, pp. 262-3, pl. xxx.

<sup>7</sup> E.g., de Ridder, nos. 566-77 (single or double examples), pp. 255 ff., pls. xxix-xxx; Froehner, *Gréau Cat.*, 1232 (single) and 1234 (double), pl. ccxxxii, 3 and 5 resp., and 1272 (double), pl. cxl, 5; Kisa, figs. 17 and 18; Niessen *Cat.*, pls. li and lii.

<sup>8</sup> For illustrations and full discussion see Morin-Jean, forms 20-6 and 32, pp. 72-9, 81-2, and 252 ff.; Kisa, *Formentafel A*, pp. 327 ff.

## SKELETON CLASSIFICATION

- A. Triangular body about one-third total height
  - i. Hollow body
  - ii. Solid body
- B. Triangular body about one-half total height
  - Hollow body
- C. Squat type: triangular body, diameter of base more than one-half total height of vase
  - Hollow body
- D. Tall neck and squat, rounded body
  - i. Solid body
  - ii. Hollow body
- E. No distinction between neck and body
  - i. Solid base
  - ii. Hollow base and thin walls
- F. Tall, narrow vases with modelling mark about one-third of way up, dividing neck from body
  - Hollow body
    - (a) Flat base
    - (b) Rounded base
- G. Small, drop-shaped vases
- H. Thin-walled vases with broad, flat bodies

#### A. TRIANGULAR BODY ABOUT ONE-THIRD TOTAL HEIGHT

The majority of these vases have hollow bodies, but a few fragmentary examples with solid bodies occurred. Complete pieces were rare though fragments were very numerous. Those listed show the main varieties of colour and fabric.

##### I. HOLLOW BODY

**797.** 24/169 AF<sup>1</sup>/B Mich. 5587.

PLS. X and XX

Green; small crack in neck; milky weathering beginning on base; very bubbly.

H. 0.149 m. H. body 0.055 m. D. base 0.06 m. A.T. 0.002 m.

Rim outsplayed with downward slope and folded upward and inward. Neck tall and cylindrical with slight constriction at base made by a modelling tool. Body triangular with flat sides. Base slightly concave. Pontil technique.

Fabric 9.

**798.** 27/SG/y1 Mich. 5951.

Dark green; intact; milky-pitting weathering and iridescence combined, spreading over most of surface; very bubbly.

H. 0.107 m. H. body 0.037 m. D. base 0.05 m. A.T. 0.004 m.

Rim outsplayed horizontally and folded upward and inward. Neck cylindrical with

faint concavity in sides. Mark of modelling tool but no constriction at base of neck. Body triangular. Base concave. Pontil technique.

Fabric 9.

**799.** 26/B 56 D/A Mich. 6141.

PL. XX

Dull green; rim lost; contents stain, no weathering; full of bubbles.

H. to just below rim 0.135 m. H. body 0.033 m. D. base 0.067 m. A.T. 0.002 m. Rim lost. Neck cylindrical with slight bulge near base, and constriction at junction of neck and body. Body triangular with sides in an elongated S-curve. Base deeply concave. Pontil technique.

Fabric 9.

**800.** 26/B 24 G/G Mich. 6117.

Dark green; fragment of rim and neck; enamel-like pitting weathering in white and purple tints, far advanced, and chipping off at slightest touch<sup>1</sup>; very bubbly.

Dimensions and shape roughly as no. 799.

Fabric 9.

**801.** 25/286 B/L Mich. 6051.

Dull green, clear; rim, neck, and part of body; no weathering; very bubbly.

H. neck 0.08 m. A.T. 0.0015 m.

Rim outsplayed horizontally, folded upward and inward, and pressed down flat. Cylindrical neck with marked constriction at base. Body triangular, base lost.

Thinner ware than before.

Fabric 8.

**802.** 24/4029 B/F Mich. 5889.

Small fragment of neck. Colourless with greenish tinge; no weathering; very bubbly.

Fabric 9.

## II. *SOLID BODY*

**803.** 28/B 114 D\*/B Mich. 5952.

PLS. X and xx

Dark green; chipped on rim; incipient milky weathering in spots; exceedingly bubbly; some traces of stone.

H. 0.102 m. H. body 0.027 m. D. base 0.053 m. T. near rim 0.003 m.

Rim outsplayed horizontally, folded upward and inward, and flattened on top. Neck cylindrical with slightly concave sides. Mark of modelling tool but no constriction at base of neck. Body triangular and solid. Base flat. Pontil technique. The hollow part of the vase tapers downward and hardly extends below the base of the neck.

Fabric 9.

**804.** 26/B 3 P/C Mich. 6089.

Brown; body complete and part of neck; badly strain-cracked, enamel-like weathering; very bubbly.

H. body 0.025 m. D. base 0.047 m. A.T. in middle of neck 0.003 m.

Shape as no. 803.

Fabric 9.

<sup>1</sup> For the purple tints compare no. 722, class XI.

B. TRIANGULAR BODY ABOUT ONE-HALF TOTAL  
HEIGHT

*HOLLOW BODY*

Only the following examples, all fragmentary, have so far been found:

**805.** 24/5053 B/N Mich. 5588. PL. XX

Yellowish colourless; body in many fragments, neck still intact; badly strain-cracked, frosted; material fair.

H. 0.145 m. D. base 0.057 m. A.T. 0.004 m.

Rim outspayed, folded upward and inward, and pressed flat on top. Neck cylindrical, broadening out slightly toward base. Modelling mark but no constriction at base of neck. Body triangular. Base concave. Pontil technique.

Fabric 1 (?).

**806.** 24/5048/AQ Mich. 5827. PL. XX

Buff with opaque white spirals; fragment of body and base; no weathering; bubbly. D. base 0.056 m. A.T. 0.004 m.

Fragment of triangular body. Base concave. Closely set, spiral decoration all over body and base starting from a central blob on the base, and trailed on and marvered in before blowing.

Early ware (?).

**807.** 26/B 60 A/D Mich. 6142. PL. XX

Dull green mottled with purple; fragment of base and bottom of sides; no weathering; bubbly.

D. base 0.05 m. A.T. side 0.0015 m. A.T. base 0.003 m.

Base concave with slight kick. Very irregular mottling, made with purple glass, trailed on outside and blown with vase.

Fabric 8 (?).

**808.** 26/B 9 V/D Mich. 6107. PL. XX

Colourless with greenish tinge, opaque white spirals; fragment of base; frosted, with spots of milky-pitting weathering as well; material good; some pin-prick bubbles.

D. base 0.104 m. A.T. base 0.006 m.

Base concave. Pontil technique. Opaque white spirals, technique as no. 806, but not so closely set.

Fabric 1.

The following fragments of bodies occurred:

**809.** 28/B 127 C/J.

Dark green with opaque white spiral threads. Early ware (?).

**810.** 28/B 156 K\*/P.

Green with opaque white horizontal threads. Early ware (?).

**810 bis.** 28/C 111 L/AI Mich. 6240.

Colourless with greenish tinge; opaque white spiral threads. Fabric 1 (?).

811. 26/B 33 C/B Mich. 6130.

PL. XX

Dark purple with yellow and opaque white threads; fragments of base and side; iridescent, with strong greenish tint in part; very bubbly.

D. body 0.095 m. A.T. 0.002 m.

Fragment of body, shape as no. 805. Threads of yellow and opaque white, trailed on and marvered in and blown with vase. Those near base are horizontal, those on side of body have been combed into festoons.

Early ware (?).

812. 26/B 9 P/Q Mich. 6104.

Colourless with opaque white threads; fragment of neck; frosted; pin-prick bubbles.

A.T. 0.0015 m.

Fragment of cylindrical neck with zigzag opaque white bands trailed on horizontally and marvered in before blowing.

Fabric 2 (?).

813. 26/B 5 F/O Mich. 6095.

Fragment of base, as no. 812. Fabric 2 (?).

814. 28/B 115\*/T Cairo J 54772.

PL. XX

Opaque blue with clear blue pattern; fragment of neck; no weathering; some bubbles.

H. of fragment 0.038 m. D. c. 0.02 m. A.T. 0.002 m.

Neck cylindrical. Fish-bone pattern of separate S-curves trailed on vertically and marvered in flush with the surface. On inside of glass a solid clot of matter which is the remains of a sand core.<sup>1</sup>

Early ware (?).

### C. SQUAT TYPE: TRIANGULAR BODY, DIAMETER OF BASE MORE THAN ONE-HALF TOTAL HEIGHT OF VASE

#### *HOLLOW BODY*

Four complete or nearly complete examples were found, besides numerous smaller fragments not listed here. The type also occurs with a solid body.<sup>2</sup>

815. 26/B 24 J/A Mich. 5589.

PLS. X and xx

Dark yellowish green; intact; beginnings of enamel-like weathering; very bubbly.

H. 0.056 m. D. base 0.039 m. A.T. neck 0.004 m.

Rim outsplayed horizontally and folded upward and inward. Neck cylindrical. Body triangular. Modelling mark at base of neck. Base flat. Pontil technique, with brown metallic mark of pontil.

Fabric 9.

<sup>1</sup> Egyptian glass of dynastic times was always made by modelling the vessel on a sand core, and this method was not entirely discontinued even after the invention of glass-blowing.

<sup>2</sup> E.g., British Museum, Egyptian Department, no. 58579, and two examples in Toronto.

**816.** 26/B 41 E/B Mich. 5590.

Yellowish green; intact; usage scratches, beginnings of pitting; bubbly; blowing spirals noticeable.

H. 0.053 m. D. base 0.043 m. A.T. neck 0.004 m.

Shape as no. 815, but sides of neck slightly concave and sides of body slightly convex.

Fabric 9.

**817.** 24/x Mich. 5591.

Dark sea green; part of neck and rim missing; usage scratches, no weathering; material very bad; full of large bubbles and patches of unfused sand.

H. 0.059 m. D. base 0.041 m. A.T. neck 0.005 m.

Shape as no. 816.

Fabric 9.

**818.** 27/SG/ZI.

Dark green; most of rim missing; milky weathering over most of surface; very bubbly.

H. 0.061 m. D. base 0.038 m. A.T. neck 0.004 m.

Shape as no. 816.

Fabric 9.

#### D. TALL NECK AND SQUAT, ROUNDED BODY

One complete specimen and several fragmentary ones occurred, but the type seems to have been, on the whole, rare. Some have solid, some hollow bodies.

##### I. SOLID BODY

**819.** 26/B 41 E/C Mich. 5592.

PLS. X and XX

Dark greenish yellow; broken in two, complete; pitted; material very bad indeed; full of brown and black impurities, bubbles, and patches of stone.

H. 0.104 m. D. base 0.048 m. A.T. neck 0.003 m.

Rim outspayed horizontally, folded upward and inward, and flattened on top. Neck cylindrical with slight broadening toward its base. Body rounded. Modelling mark at junction of neck and body. Base flat. Pontil technique.

Fabric 9.

##### II. HOLLOW BODY

Three nearly complete specimens were found; the type is exactly as before except that the body is more or less hollow.

**820.** 28/156\*/FII.

Fragment of neck and body, green. Fabric 9.

**821.** 28/B 131/W.

Fragment of neck and body, dark green. Fabric 9.

**822.** 26/B 7 F/V Mich. 6097.

Fragment of neck and body, dark green. Fabric 9.

## E. NO DISTINCTION BETWEEN NECK AND BODY

Fragments of this type were exceedingly common; only specimens that are complete or nearly complete are listed.

## I. SOLID BASE

**823.** 24/x Mich. 5594. PLS. X and xx  
 Olive green; half of rim lost; no weathering; material bad; very bubbly.  
 H. 0.054 m. D. base 0.031 m. A.T. neck 0.003 m.  
 Rim outsplayed horizontally, folded upward and inward, and flattened on top. Neck cylindrical, broadening out toward base of vase; no distinct body. Base flat. Pontil technique. Hollow part of vase very narrow with downward taper.  
 Fabric 9.

**824.** 26/B 11 A/C Mich. 6267.  
 Green; most of rim lost; milky-pitting weathering over whole surface, which flakes off at slightest touch; very bubbly.  
 H. 0.103 m. D. base 0.031 m. A.T. neck 0.0025 m.  
 Shape as no. 823.  
 Fabric 9.

**825.** 25/293 A/x Mich. 6266.  
 Dark clear green; most of rim lost; usage scratches, no weathering; very bubbly; accidental hole in one side near base, made during blowing and afterwards filled in by maker.  
 H. 0.088 m. D base 0.039 m. A.T. neck 0.004 m.  
 Fabric 9.

**826.** 28/B 152 B/C Mich. 6292.  
 Dark green; part of rim lost; milky-pitting weathering over most of surface; very bubbly; much stone.  
 H. 0.125 m. D. base 0.038 m. A.T. neck 0.003 m.  
 Rim outsplayed horizontally with dip at edge and folded upward in thin fold; otherwise as no. 823.  
 Fabric 9.

**827.** 28/B 157 A/A Mich. 5955. PLS. X and xx  
 Dark green; chipped on rim; milky-pitting weathering over greater part of surface; bubbly.  
 H. 0.104 m. D. base 0.039 m. A.T. neck 0.003 m.  
 Shape as no. 826, but fold of rim only visible in part.  
 Fabric 9.

**828.** 25/115 A/v Mich. 5593 Donor.  
 Dark bluish green; intact; beginning of enamel-like weathering; bubbly, with impurities.  
 H. 0.105 m. D. base 0.038 m. A.T. neck 0.0045 m.  
 Shape as no. 826, but no trace of fold at rim.<sup>1</sup>  
 Fabric 9.

<sup>1</sup> It is probable that in all these rims some folding has taken place, but the glass has been pressed in so tightly that it is often no longer visible.

829. 28/B 153 B\*/D.

Dark green; fragment of neck and rim; brown enamel-like weathering, iridescent in parts; bubbly.

Dimensions roughly as no. 828.

Rim<sup>1</sup> outsplayed horizontally and folded upward and inward at angle of 45°.

Fabric 9.

Other fragments of necks and bodies occurred:

830. 27/CA 70/PI Mich. 6218.

Green with white enamel-like weathering. Fabric 9.

831. 28/136\*/LI.

Light green. Very small interior, ending in point half-way down vase. Fabric 9.

832. 28/B 168 K/K.

Dark green. Fabric 9.

II. *HOLLOW BASE AND THIN WALLS*

Only one recognizable example has so far been discovered; the type cannot have been common.

833. 26/B 21 P/E Mich. 5954.

PLS. X and XX

Dark olive green; part of rim and neck lost; strain cracks, and milky-pitting weathering in spots; bubbly; full of impurities and patches of stone.

H. 0.086 m. D. base 0.043 m. A.T. neck 0.0015 m. A.T. base 0.005 m.

Rim slightly outsplayed, and folded inward and downward in small fold. Sides straight, widening out gradually from constriction below rim to base. Base flat. Pontil technique.

Fabric 9, or very coarse fabric 5.

F. TALL, NARROW VASES WITH MODELLING MARK  
ABOUT ONE-THIRD OF WAY UP, DIVIDING NECK  
FROM BODY*HOLLOW BODY*

The following specimens were listed; smaller fragments also occurred, but the type was not very common.

## (a) FLAT BASE

834. 24/169 V/X Mich. 5595.

PLS. X and XX

Dark green; intact; no weathering; very bubbly; many black impurities.

H. 0.161 m. D. base 0.029 m. H. body 0.053 m. A.T. neck 0.004 m.

Rim outsplayed horizontally, folded upward and inward, and flattened on top. Neck cylindrical with slightly concave sides. Body narrow and triangular with almost vertical sides. Modelling mark at junction of neck and body. Base flat. Pontil technique.

Fabric 9.

<sup>1</sup> For the rim compare no. 763, class XI. It is a type of rim common on Syrian glass.

## (b) ROUNDED BASE

835. 26/B 45 K/D Mich. 6135.

PL. XX

Bright green; rim lost; no weathering; very bubbly.

H. to just below rim 0.09 m. H. body 0.03 m. G.D. body 0.017 m. A.T. 0.001 m. Rim lost. Neck cylindrical with slightly concave sides. Body drop-shaped with rounded base. Constriction and modelling mark at junction of neck and body.

Slight flattening on under side of base.

Fabric 5 or 9.

## G. SMALL, DROP-SHAPED VASES

No complete example occurred, but the two following fragments give a restoration of the type. No other fragments were found.

836. 28/B 126\*/H.

Dark green; fragment of neck and rim; no weathering; very bubbly.

D. rim 0.01 m. A.T. 0.001 m.

Rim outsplayed horizontally, and folded upward and inward. Neck cylindrical.

Body lost.

Fabric 9.

837. 28/242\*/W Mich. 6226.

PL. XX

Greenish colourless; fragment of body and base; strain cracks, milky weathering; bubbly.

D. body 0.013 m. A.T. 0.0005 m.

Neck cylindrical, widening out slightly toward base into drop form. No distinction between neck and body. Base flat. Pontil technique.

Fabric 8 (?).

## H. THIN-WALLED VASES WITH BROAD, FLAT BODIES

Only fragmentary specimens have been found. The type is common and only a few pieces have been listed.

838. 26/B 48 C/A Mich. 6137.

PL. XX

Dull bluish green; rim, neck, and part of body; milky weathering begun; very bubbly.

H. neck 0.07 m. D. rim 0.033 m. A.T. 0.001 m.

Rim well outsplayed horizontally, and folded upward and inward in small fold.

Neck cylindrical, but broadening out slightly toward its base. Body very flat with sloping shoulders. No modelling mark at junction of neck and body. Base lost.

Fabric 8.

839. 24/5048/AQ Mich. 5827.

Green; rim, neck, and part of body; no weathering; very bubbly.

H. neck 0.075 m. A.T. 0.001 m.

Shape as no. 838, but faint modelling mark at junction of neck and body.

Fabric 8.

**840.** 26/BC 39 A/E Mich. 6147.

Dull bluish green; neck, body, and base; spots of milky weathering; very bubbly.

H. to just below rim 0.083 m. D. base 0.048 m. A.T. 0.001 m.

Neck and body as no. 838. Base concave with kick. Pontil technique.

Fabric 8.

**841.** 26/B 4 D/R Mich. 6090.

Greenish colourless; neck, body, and base; dirty, no weathering; very bubbly.

H. to just below rim 0.062 m. D. base 0.041 m. A.T. 0.001 m.

Rim lost. Neck and body as no. 838. Base concave with deep kick. Pontil technique.

Neck not perpendicular to body.

Fabric 8.

**842.** 26/B 7 N/G Mich. 6099.<sup>1</sup>

Greenish colourless; rim, neck, and part of body; frosted; full of bubbles.

H. neck 0.069 m. A.T. 0.0018 m.

Rim as no. 838. Neck almost cylindrical with sides broadening slightly downward.

Body flattish but distinctly triangular. Traces of modelling mark at base of neck.

Base lost.

Fabric 8.

**843.** 26/B 27 F/B Mich. 6126.

Dull bluish green; fragment of neck, body, and base; milky weathering over most of surface; very bubbly.

H. to just below rim 0.083 m. H. body 0.018 m. D. base 0.05 m. A.T. 0.001 m.

Rim lost. Neck cylindrical. Body triangular with very faint S-curve in sides. Modelling mark at junction of neck and body. Base concave with kick. Pontil technique.

Fabric 8.

<sup>1</sup> This vase and the next example are a cross between type A and type H; compare, e.g., no. 799.

## CLASS XIV

### MISCELLANEOUS OBJECTS, INLAY, AND DOUBTFUL FRAGMENTS

**G**LASS objects, as opposed to vessels and utensils, were relatively rare at Karanis, and the following list contains all the examples that were found, both complete and fragmentary.

The commonest type are the gaming-counters and marbles, *h*. Under *A* two fragmentary objects are listed which may have been lids. Articles of adornment were surprisingly rare; there were only some fragmentary bracelets, *B*, of black glass, one ring and one ring-stone, *C*, and a few amulets, *D*. The use of the pierced buttons, *J*, is doubtful, but they were perhaps nailed or riveted in position as decorations for wood or leather; or they may have been used as stops on glass kohl-sticks. The lenses, *G*, form a small but uniform group, and so do the little relief-disks, *K*, which may have been merchandise marks or tickets for meetings or festivals. Of stirring-rods, *E*, and spoons, *F*, only a few fragments occurred.

Inlay fragments, *L*, were not uncommon, and a few interesting pieces were found which preserved several bits still *in situ* in their pitch background; these give some idea of the technique of inlay work. The other fragments are all single pieces; some are polychrome, some monochrome.

Some pieces of flat plates of coarse glass, *M*, may have been used for glazing windows, though it must be admitted that no single instance of a window was discovered which had fittings to receive such glass.

Finally, a few objects and fragments, *N*, of quite uncertain use are included at the end. Amongst these, however, are two fragments of frit which are important, for they are evidence, although but slight, that glass-working was carried on at Karanis.

It has seemed quite useless to attempt a classification of these various objects and fragments by fabric. Some may belong to the same fabrics as the vessels, others undoubtedly do not. And as to date, more of the pieces seem to come from early houses than from late ones; more definite conclusions are not admissible on the available evidence.

## SKELETON CLASSIFICATION

- A. Lids
- B. Bracelets
  - (a) Plain, with semicircular cross-section
  - (b) Decorated on outside with slanting raised pinches
  - (c) Decorated on outside with transverse stamped indents set close together
- C. Finger-rings and ring-stones
  - i. Finger-rings
  - ii. Ring-stones
- D. Amulets
- E. Glass rods
- F. Spoons
  - (a) With flat bowl
  - (b) With concave bowl
- G. Lenses
- H. Gaming-pieces
  - i. Marbles
    - 1. Monochrome
    - 2. Polychrome
  - ii. Pyramidal piece, hexagonal in section
  - iii. Round or oval disks of segmental vertical section, with rounded edges
    - 1. Monochrome
    - 2. Polychrome
- J. Pierced buttons
  - i. Large buttons, circular with segmental section; lateral boring
  - ii. Small buttons, circular with rectangular section; lateral boring
- K. Disks stamped in relief
  - i. Opaque red glass
  - 2. Deep purple transparent glass
- L. Fragments of inlay
  - 1. Fragments of patterns with more than one piece of inlay still preserved in combination
  - 2. Single pieces of millefiori and polychrome glass
  - 3. Single pieces of monochrome glass
  - 4. Shaped fragments of figure or floral patterns and other miscellaneous pieces
- M. Fragments of window-glass
- N. Miscellaneous objects and fragments of uncertain use
  - Applied medallions
  - Fragment of a cylindrical object pierced longitudinally with a rectangular boring
  - Two fragmentary beads of doubtful use
  - Fragments of frit
  - Fragment of a stand (?)
  - Fragment of flower-shaped neck of bottle (?)
  - Oval object made of two layers of glass, use unknown
  - Base of test-tube (?)
  - Fragment of a solid stem

## A. LIDS

Two fragmentary examples of lids were found, both, to judge from their location and fabric, of fourth-century date. No parallels to these lids—if such indeed they are—exist either from Egypt or elsewhere. Lids of other types are, of course, common enough, notably the knobbed, bowl-shaped variety found frequently with bulbous cinerary-urns,<sup>1</sup> and a small saucer-shaped kind which was used as a cover for deep bowls or beakers. The latter type is often decorated on its under side with painted designs.<sup>2</sup> Cylindrical boxes of glass with lids are also found.<sup>3</sup>

844. 25/5056/F Mich. 5986.

PL. XXI

Greenish colourless; edge chipped away; frosted; bubbly.

D. 0.065 m. D. knob 0.016 m.

Flattish, circular lid of blown glass with edges bent over downward. Above, in centre, a spherical knob, and a corresponding boss on under side. On top of knob, a pontil mark.

Fabric 3.

845. 28/B 151/C Mich. 5987.

PL. XXI

Green; fragmentary; under side well worn by use, no weathering; very bubbly; some streaks of black impurities.

D. c. 0.09 m. H. in centre 0.04 m.

Solid lump of glass of roughly triangular section, flattened by pressure on under side and coiled into a rough loop handle above.

Fabric 9.

## B. BRACELETS

The following fragmentary examples occurred. All are of opaque black drawn glass. Most of them show patches of enamel-like weathering. Similar bracelets of black glass are found not only elsewhere in Egypt<sup>4</sup> but also in Syria and in the west.<sup>5</sup> Examples in

<sup>1</sup> E.g., Edgar, *Cat.*, no. 32748; Morin-Jean, forms 1, 2, and 4, fig. 11; Kisa, forms C 167, 170, 172, figs. 54-5.

<sup>2</sup> Kisa, pp. 813 ff., figs. 341-2, and two examples in the British Museum, one bearing as design a winged female figure, the second a cupid and grape-clusters. A plain example in the same museum, found with a beaker, comes from the Franks collection, 1878, and is said to have been found in Egypt. The beaker which goes with it is, however, Syrian in type, such as is commonly found on early Roman sites in Cyprus and elsewhere.

<sup>3</sup> Niessen *Cat.*, no. 463, pl. xxiii; and an example in the British Museum from near Rome (bought from Castellani, 1873), which is very large and of greenish blue opaque glass. Compare also a bronze box, Niessen *Cat.*, no. 3776, pl. cxix.

<sup>4</sup> Petrie, *Daily Use*, p. 8, pl. vii, 100-1; *id.*, *Hyksos*, p. 41, pl. xxxviii A (grave 725), and numerous examples in museums.

<sup>5</sup> E.g., de Ridder, p. 283, notes 8 and 10 (quoting examples from Carthage and

purple, blue, and green glass, and in variegated glass are also fairly common.<sup>1</sup> In the absence of external evidence it is not always easy to distinguish Roman examples of variegated glass from those of pre-Roman or post-Roman date: it is the monochrome types that are the most distinctively Roman.

(a) PLAIN, WITH SEMICIRCULAR CROSS-SECTION

846. 27/c 65 H/B Mich. 5990.

PL. XXI

D. 0.05 m. T. 0.005 m.

847. 28/c 56 N/NI Mich. 5989.

D. 0.057 m. T. 0.004 m.

848. 27/c 41 A/LI Cairo J 52801.

D. c. 0.07 m. T. 0.005 m.

849. 27/c 45 N/O Mich. 5988.

Fragments of two different bracelets.

(a) D. c. 0.08 m. T. 0.006 m.

(b) D. c. 0.07 m. T. 0.008 m.

(b) DECORATED ON OUTSIDE WITH SLANTING RAISED PINCHES

850. 27/c 65 H/B Mich. 5990.

PL. XXI

D. c. 0.07 m. T. 0.007 m.

850 bis. 27/c 61 A/EII Cairo J 52802.

D. c. 0.075 m. T. 0.006 m.

(c) DECORATED ON OUTSIDE WITH TRANSVERSE STAMPED INDENTS SET CLOSE  
TOGETHER

851. 27/c 56 E/W Mich. 5992.

PL. XXI

D. 0.068 m. T. 0.004 m.

852. 28/242\*/WI.

Fragments of two different bracelets.

(a) D. c. 0.055 m. T. 0.005 m.

(b) D. c. 0.057 m. T. 0.004 m.

853. 28/c 42 D/EI Mich. 5991.

D. c. 0.05 m. T. 0.003 m.

854. 24/131 C/N Mich. 5419.

D. 0.05 m. T. 0.005 m.

Cyprus); Kisa, p. 139 (two in the Vatican, &c.); Morin-Jean, p. 253, fig. 330 (fragments in a tomb-group from Kreuznach of first century A.D.); and examples in St. Germain from Mont Beauvray and elsewhere. Some of these Gallic pieces are certainly as early as the first century A.D., and the Egyptian examples are more likely fourth, so that the type must have lasted throughout the Roman period.

<sup>1</sup> Kisa, pp. 138 ff., and Niessen Cat., no. 25 a-m, pls. iii and xi (mostly from Syria—some, perhaps, post-Roman). See also Cesnola, *Atlas*, iii, pl. Ixxvi, 10-12, and Reisner, Fisher, Lyon, *Harv. Excav. at Samaria*, i, 332.

## C. FINGER-RINGS AND RING-STONES

## I. FINGER-RINGS

Only one example has been found. No ring of this type appears in any other publication of Egyptian material, but there is an unpublished example in the Victoria and Albert Museum.<sup>1</sup> The type was widespread, for examples from the Caucasus are in the Prehistoric Museum, Berlin, and another specimen, found at Cologne, is now in the museum there. Further instances from various parts of the Empire are given by Kisa.<sup>2</sup> Other types of glass finger-rings of Roman date are mentioned by Petrie,<sup>3</sup> and by Kisa.<sup>4</sup>

855. 27/242 F/S Cairo J 52803.

PL. XXI

Black opaque; intact; no weathering.

D. 0.022 m. D. of bezel 0.008 m.

Circular hoop with flat circular bezel on one side in imitation of a signet-ring. Made from a coil of drawn glass by flattening one end and folding back the other to join it.

## II. RING-STONES

Only one example has been found. The use of glass ring-stones in antiquity, more particularly during the Roman period, was so prevalent that it need not be dilated upon. Examples are to be found in every museum.

856. 27/C 35 B/J Cairo J 52800.

PL. XXI

Blue, transparent; intact; no weathering.

Maj. Ax. 0.018 m. Min. Ax. 0.015 m. T. 0.002 m.

One side plain, with bevelled edge; on the other a crude design in intaglio, apparently a draped female pouring a libation on an altar. Between her head and her left arm, which is raised, is a minute cross.<sup>5</sup>

## D. AMULETS

Amulets of glass were not so numerous as might have been expected: only three examples can be listed, one, a fragmentary crescent, and the others, small, one-handled jugs. Of these types the first was common in Egypt from dynasty XVIII onward,<sup>6</sup> and according

<sup>1</sup> From Oxyrhynchus, no. 1298. 1904.

<sup>2</sup> Kisa, p. 140.

<sup>3</sup> Petrie, *Daily Use*, p. 15, pl. xi, nos. 15 (with concave bezel ready to receive a ring-stone, probably of glass) and 18.

<sup>4</sup> *Ibid.*

<sup>5</sup> The scene is undoubtedly a pagan one, so that this cross cannot have a Christian significance. The drawing is so poor that it is probably meant to represent a knot of hair behind. Dr. J. G. Milne suggests that the scene is copied from the type of Eusebeia on coins of Alexandria.

<sup>6</sup> Petrie, *Amulets*, type 85, p. 23, pl. vi.

to Petrie, the Hawara portraits show that it was particularly prevalent during the early second century A.D. The present example, which comes from a B-period house of 1927, is later, belonging to the third or fourth century. The type was also exported, for an identical piece from the Caucasus is in the Prehistoric Museum, Berlin. The use of miniature jugs as amulets is even more widespread, though Petrie only lists one specimen in his publication of the material at University College.<sup>1</sup> Examples may be seen in most collections of Egyptian amulets,<sup>2</sup> and they, too, were frequently exported; to mention no others, an example of Egyptian fabric has been found on an Anglo-Saxon necklace at Holywell Row near Mildenhall in Suffolk.<sup>3</sup> Two similar miniature jugs, found at Cologne, are in the Niessen collection,<sup>4</sup> but they may have been made in a Rhineland factory.

857. 27/B 103/H Mich. 4760.

PL. XXI

Green with yellow streaks; part of one horn missing.

W. from tip to tip of fragment 0.021 m.

Fragment of a crescent amulet: two horns curving inward toward each other, and between them a ring for suspension, so that the horns hang downward; in front of the suspension ring, a small yellow flower with red centre.

Perhaps taken from a pot of the common green and yellow millefiori glass.

858. 27/C 56 E/L Mich. 4761.

Opaque red; part of handle missing.

H. 0.01 m. G.W. 0.012 m.

Minute jug: bead rim, ovoid body, and flat base; fragmentary handle (?). Sides of cavity taper downward.

859. 27/CA 71/G Mich. 5962.

PL. XXI

Opaque greenish blue; handle and some chips missing; weathering far advanced, decomposing in crystals with a fine iridescent sheen, a cross between flaky iridescence and enamel-like pitting.

H. 0.02 m. G.D. 0.015 m. D. of cavity 0.003 m.

Minute jug: cylindrical neck with a thick roll in glass just below rim; body heart-shaped with rising shoulders; solid base coil, unevenly made; cavity cylindrical. Traces of a handle which joined neck roll with shoulder.

## E. GLASS RODS

Under this head are grouped both kohl-sticks, i.e. tapering rods for putting on eye-paint and other toilet uses, and also cylindrical stirring-rods. One complete example and four fragments were found.

<sup>1</sup> *Ibid.*, type 70 k, p. 20, pl. v.

<sup>2</sup> There are several, e.g., in the Knox-Shaw collection, recently presented to the Ashmolean Museum, Oxford (nos. 1931. 683 a-c).

<sup>3</sup> Now in Cambridge; Lethbridge in *Camb. Antiq. Soc.*, 4to ser., vol. iii, 25 (grave 48), fig. 12, 7.

<sup>4</sup> *Niessen Cat.*, nos. 101-2, pl. i.

The kohl-stick of glass is much rarer than its parallels in other materials, e.g., bone or bronze. No other instance of the type seems to have been published, though search in museums would probably bring further specimens to light. The stirring-rod, on the other hand, of which only three fragmentary pieces are listed here, is prevalent all over the Empire, on both eastern and western sites.<sup>1</sup> It is probable that some of the pierced buttons (j) were used as stops on these stirring-rods.<sup>2</sup>

**860.** 26/B 1 c/01 Cairo J 52794.

PL. XXI

Colourless; intact.

L. 0.12 m. W. at top 0.008 m.

Kohl-stick: blunt-pointed at thick end and tapering thence to a sharper point at thin end; the two points have a ground surface; the body is decorated with a series of closely set, spiral ribs.

**861.** 24/x Mich. 5884.

Colourless; thick end missing.

L. of fragment 0.083 m. W. at top 0.004 m.

Kohl-stick: shape as no. 860.

**862.** 26/B 36 A/F Mich. 5993.

PL. XXI

Colourless; fragment of centre only.

L. of fragment 0.058 m. D. 0.007 m.

Stirring-rod, fragmentary: cylindrical with closely set, spiral ribs.

**863.** 27/c 51 A/c1 Mich. 5994.

PL. XXI

Light blue; fragment of centre only.

L. of fragment 0.031 m. D. 0.003 m.

Stirring-rod, fragmentary: shape as no. 862.

**864.** 26/B 8 c/k Cairo J 52797.

Opaque black with turquoise blue, yellow, and opaque red spirals; fragment of centre only.

L. of fragment 0.025 m. D. 0.0075 m.

Stirring-rod, fragmentary: cylindrical, with marvered-in spirals of three colours.

## F. SPOONS

Three fragmentary glass spoons were found, two belonging to a type with a flat bowl and one to a type with a concave bowl. The variety with flat bowl, on which the bowl is so small as hardly to merit the name, was doubtless intended to serve rather as a spatula, like the bronze examples of Roman date which are so frequent not

<sup>1</sup> Kisa forms G 408–9, pp. 353–4; a good example in its toilet-bottle is illustrated by G. Sangiorgi, *Coll. di vetri antichi*, pl. xiv, no. 98.

<sup>2</sup> See p. 295 below and references there.

only in Egypt,<sup>1</sup> but also in Syria and in the west.<sup>2</sup> The spoon with concave bowl would be, on the contrary, really serviceable as a spoon, and the examples were in all probability used for some special purpose for which glass was a more suitable material than the metals.<sup>3</sup> No other examples of glass spoons are known from Egypt, but specimens are not uncommon elsewhere. A complete example from Idalium,<sup>4</sup> of yellow glass, is in the Cesnola collection in the Metropolitan Museum, and a fragmentary specimen of green glass, with a heart-shaped bowl, is in Nîmes (Maison Carrée). Such spoons were also made of colourless glass with patterns of cut facets on the convex side of the bowl. Two fine bowls—the handles are unfortunately lost—of this type, one from Melos and the other from Rome, are now in the British Museum (Burgon collection, nos. 325-6) and a similar piece, but more fragmentary, was found in Cannon Street, London, and is now in the Department of British and Mediaeval Antiquities of the same museum (Roach Smith collection, 1856). All three are illustrated (Fig. 4, m, n, o). A fourth example is in the Sangiorgi collection in Rome.<sup>5</sup>

(a) WITH FLAT BOWL

865. 26/B 4 D/O Mich. 5995.

PL. XXI

Yellow; handle and part of bowl.

L. of fragment 0.103 m. D. handle 0.005 m.

Spoon, fragmentary: cylindrical handle, flattened at one end to form a circular bowl.

Incised mark at junction of handle and bowl.

866. 26/BS 2/C1 Mich. 5996.

PL. XXI

Yellow; bowl and part of handle.

L. of fragment 0.07 m. D. of bowl 0.017 m.

Spoon, fragmentary: shape as no. 865, but the bowl complete.

(b) WITH CONCAVE BOWL

867. 28/B 153 B\*/C Cairo J 54773.

PL. XXI

Greyish colourless; bowl only.

D. bowl 0.028 m. T. 0.0025 m.

Spoon, fragmentary: cylindrical handle, lost; circular bowl, deeply concave, with raised tongue on under side in continuation of handle.<sup>6</sup> The whole moulded out of one piece of glass and polished.

<sup>1</sup> Petrie, *Daily Use*, p. 28, pl. xxiii.

<sup>2</sup> E.g., *Niessen Cat.*, pl. cxxii, &c.

<sup>3</sup> Metal spoons of gold, silver, bronze, &c., are quite common; see *Niessen Cat.*, pl. cxxii, &c.

<sup>4</sup> Cesnola, *Atlas*, iii, pl. cvii, 2.

<sup>5</sup> G. Sangiorgi, *Coll. di vetri antichi*, pl. xxx, no. 151.

<sup>6</sup> Compare the tongue on modern spoons.

## G. LENSES

These objects were certainly magnifying glasses: that they do not any longer serve that purpose is explained by the clouded state of their surface owing to weathering. Two complete and two fragmentary specimens occurred, all of uniform type.

Similar lenses of Roman date have been found elsewhere in Egypt, e.g., at Tanis and at Hawara by Petrie.<sup>1</sup> A recent article on early magnifying glasses by H. C. Beck<sup>2</sup> mentions, besides Roman ones, some earlier ones of the sixth to fourth century B.C. found at Carthage and now in the Lavigerie Museum there, while Kisa<sup>3</sup> refers to examples of the Greek period from Nola as well as to Roman pieces found in England, at Pompeii, and elsewhere. Their use was therefore widespread, and began at least as early as the fourth century B.C. Beck, indeed, on the analogy of similar lenses made of crystal which have been found in a layer of about 1600-1200 B.C. in Crete, thinks that glass lenses may also go back to that early period.

868. 26/B 12 A/R Mich. 5969.

PL. XXI

Greenish colourless; intact, but chipped and scratched by usage; many pin-prick bubbles and some impurities.

D. 0.051 m. H. in centre 0.011 m.

Lens, circular: under side flat, upper side conical: edge ground flat and c. 0.003 m. thick, the rest of the surface, both above and below, polished by rotatory motion.

869. 24/5011 B/C Cairo J 52787.

Greenish colourless; intact; spots of iridescence; many pin-prick bubbles and many black impurities.

D. 0.05 m. H. in centre 0.0075 m.

Lens, circular: under side flat, upper side convex; edges sharp and less than 0.001 m. thick; the whole polished by a rotatory motion.

870. 26/B 53 D/D Mich. 5970.

Colourless with greenish tinge; almost complete, but badly strain-cracked; good glass, no bubbles.

D. 0.055 m.

Lens, circular: shape as no. 869.

871. 28/B 141 K/E.

Greenish colourless; half extant; spots of milky pitting; many pin-prick bubbles.

D. 0.053 m. H. in centre 0.011 m.

Lens, circular: shape as no. 869.

<sup>1</sup> Petrie, *Tanis*, i, 49, pl. xii, 30 (two examples, one fragmentary, both now in the Egyptian Department of the British Museum, no. 22522), and *id.*, *Kahun*, p. 20 (from Hawara).

<sup>2</sup> *Antiq. Journ.*, viii, 327-30.

<sup>3</sup> Kisa, pp. 355-7 and earlier references quoted there.

## H. GAMING-PIECES

### I. MARBLES

Numerous examples of glass balls were found, some of monochrome, others of polychrome or millefiori glass. Most of them are roughly made and anything but truly spherical in shape, but there can be no doubt that they are similar to modern glass marbles, and were meant to serve as pieces for playing a game. Considering the numerous examples listed below, and further specimens in other collections,<sup>1</sup> it is strange that no instances of these pieces have been previously published from Egypt. Petrie describes an ancient Egyptian game called 'henu' which was played on a spiral board with (among pieces of other shapes) spherical balls, and he illustrates stone balls which were probably used for this game,<sup>2</sup> but he makes no mention of glass balls. Kisa, though mentioning numerous other shapes of gaming-pieces,<sup>3</sup> is equally silent about spherical ones. Yet an inscription of the second century A.D.<sup>4</sup> tells of one Ursus who had been adept at playing with glass balls, and probably examples from sources other than Egypt exist in museums.

#### 1. *Monochrome*

872. 26/B 3 E/R Mich. 5985.

Greenish colourless. D. 0.017 m.

873. 24/5006 A/AA Mich. 5841.

Light green. D. 0.024 m.

874. 26/B 8 C/M Mich. 5977.

Green, with white streaks of stone; roughly shaped and well worn by use. D. 0.021 m.

875. 27/C 38 B/K Mich. 5983.

Green, pitted. D. 0.018 m.

876. 27/C 53 C/CI Mich. 5976.

Green. D. 0.027–0.03 m.

877. 26/B 4 N/B<sup>1</sup> Mich. 5981.

Opaque white. D. 0.021 m.

878. 26/B 26 B/C Mich. 5984.

Opaque white. D. 0.018 m.

879. 26/B 41 C/D Cairo J 52793.

Opaque red. D. 0.015 m.

<sup>1</sup> E.g., five examples in the British Museum, from *Oxyrhynchus*, 1906.

<sup>2</sup> Petrie, *Daily Use*, p. 56, pl. xlviii, nos. 198–215.

<sup>3</sup> Kisa, pp. 141 ff.

<sup>4</sup> CIL. 6. 9797, 1, quoted by Trowbridge, *Philol. Studies*, p. 184: '... vitrea qui primus pila lusi decenter ...'

2. *Polychrome*

880. 26/B 20 G/c Mich. 5982.

Green and yellow millefiori glass of common type, fragmentary. D. c. 0.015 m.

881. 26/B 4 N/B<sup>2</sup> Mich. 5981.

Half of green translucent glass, half of opaque variegated glass, yellow, blue, and black. D. 0.018 m.

882. 28/C 49 J<sup>1</sup>/A.

Dark purple glass with marbling of opaque white and yellow. D. 0.0185 m.

883. 26/B 12 A/P Cairo J 52792.

Green with red and white rectangular inlays. D. 0.018 m.

884. 28/156\*/SI.

Green, with rectangular variegated inlays. D. 0.018 m.

885. 26/B 2 H/Q<sup>1</sup> Mich. 5978.

Dark green, with central band made up of cross streaks of red, yellow, and opaque white. D. 0.017 m.

886. 26/B 2 H/Q<sup>2</sup> Mich. 5978.

Millefiori glass, yellow, green, red, opaque white, purple, &amp;c., in no settled pattern. D. 0.025 m.

887. 27/C 45 D/E Cairo J 52790.

Millefiori glass, mainly green, with patches of blue and purple. Well worn by use. D. 0.035 m.

888. 27/C 45 L/c Mich. 5980.

Millefiori glass, yellow, green, red, and colourless in no settled pattern. Flaky weathering well advanced. D. 0.025 m.

889. 27/C 51 J/WI Cairo J 52791.

Millefiori glass, red, yellow, and dark and light blue in no settled pattern. Flaky weathering well advanced. D. 0.025 m.

890. 28/242\*/H.

Millefiori glass, yellow, red, black, and blue in no settled pattern. Badly chipped. D. 0.044 m.

891. 28/C 91 K/G.

Millefiori glass, yellow, green, black, white, blue, and red in no settled pattern. D. 0.025 m.

892. 28/C 102 J/F.

Millefiori glass, yellow, blue, red, and pale pink in no settled pattern. Fragmentary. D. c. 0.045 m.

893. 27/C 10 B/G Mich. 5979.

Variegated with many colours partly from original composition and partly because of iridescence. D. 0.02 m.

## II. PYRAMIDAL PIECE, HEXAGONAL IN SECTION

Only one example was found. Three similar pieces, one of red, one of green, and one of millefiori glass, are published by Petrie,<sup>1</sup> and are attributed by him to the game of 'sent,' a game frequently figured on Egyptian monuments.

894. 26/B 3 o/b Cairo J 52804.

PL. XXI

Millefiori glass, red, white, blue, and green in no settled pattern; badly chipped.

H. 0.047 m. W. at bottom 0.021 m.

Hexagonal pyramid with slightly convex sides and flat base.

## III. ROUND OR OVAL DISKS OF SEGMENTAL VERTICAL SECTION, WITH ROUNDED EDGES

These were the commonest type of glass object, and were used as counters for a game played on a chequer-board. They vary very much in colour; some are of monochrome, others are of polychrome or millefiori glass. Objects like these are as common on other sites, both in Egypt and outside it, as they are at Karanis; groups of them are frequently found in tombs of the Roman age in the west.<sup>2</sup> Very similar pieces, but larger, and usually concave on the under side, belong to the Hellenistic period. Those of Imperial date have been found all over the Roman Empire, and even beyond its confines, being specially frequent in Scandinavia.<sup>3</sup> Both at Karanis and elsewhere, the commonest varieties are black, opaque white, and transparent green, but pieces of almost any colour may be found. Latin authors<sup>4</sup> several times mention a game played on a chequer-board with glass counters in which the blacks were opposed to the whites. This was undoubtedly the game for which these pieces were used. When found together in any numbers whites (i.e., not only opaque white but also green and other light-coloured pieces) are usually found alongside blacks (i.e., not only actual black examples, but also dark-coloured pieces). And a Roman roofing tile, marked out roughly in squares  $9 \times 9$  as a gaming-board, was found at Mayence and is now in the museum there.<sup>5</sup>

Alternatively some of these counters, more especially those of

<sup>1</sup> Petrie, *Daily Use*, pp. 51 ff., pl. xlviii, 7-9.

<sup>2</sup> Kisa, pp. 141-2 and 354.

<sup>3</sup> Kisa, pp. 212 and 919.

<sup>4</sup> *Auctor Laudis Pisonis*, 180 ff. (*Corpus Poet. Lat.*, 1833, p. 1412): Ov. *Ars Amat.*

2. 208: Mart. 7. 72. 8. See Trowbridge, *Philol. Studies*, p. 183, and Kisa, p. 142.

<sup>5</sup> Behrens, 'Neue Funde aus dem Kastell Mainz,' *Mainz. Zeitschr.*, vii, 107, fig. 17.

In the same fort a hoard of these counters, 20 white and 11 black, was found (*ibid.*, p. 108).

irregular or oval shapes, may have been employed in metal holders as jewel-stones.

Two other suggestions as to the use of these objects have been put forward, neither of which seems probable. Dr. G. Eisen,<sup>1</sup> on the strength of a necklace which was said to have been found in Egypt and to be of Roman date, thought that they were used in pairs, cemented together back to back, and strung as necklaces. But the genuineness of the necklace on which Eisen based his conclusions is open to grave doubt: it is just such an object as an unskilful native forger would fashion out of these little glass objects to make them more attractive in the antique market.

Mrs. Elderkin, on the other hand,<sup>2</sup> would make these, like the pierced buttons, *j*, into clothing-fasteners; for this purpose they would, she says, be mounted in a holder. It is conceivable, of course, that occasionally they were so used. But would not the advantages of a pierced button have been sufficiently obvious to prevent the use of this much less suitable type in such quantities?

#### 1. *Monochrome*

**895.** 28/CS 100/DII.

Colourless. D. 0.012 m. T. 0.004 m.

**896.** 26/B 18 F/H Cairo J 52786.

Colourless with accidental patch of blue in centre; frosted and milky in patches.

Three impressed hollows on each face, unevenly placed.<sup>3</sup> Oval. Maj. Ax. 0.015 m.  
Min. Ax. 0.011 m. T. 0.006 m.

**897.** 27/C 45 L/D Mich. 4753.

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Opaque white. D. 0.019 m. T. 0.007 m.

**898.** 26/B 4 F/C Cairo J 52778.

Opaque white. D. 0.018 m. T. 0.005 m.

**899.** 26/BS 1/U Mich. 5998.

Opaque white. D. 0.015 m. T. 0.006 m.

**900.** 28/BS 116/C.

Light green with white streaks of stone. D. 0.014 m. T. 0.006 m.

**901.** 27/C 51 A/WIII Mich. 4749.

Light green. D. 0.011 m. T. 0.005 m.

<sup>1</sup> G. Eisen, 'Button-Beads,' *Am. Journ. Arch.*, 1916, pp. 299-307, pls. ix and x. These two plates give a representative selection of types illustrated in colour.

<sup>2</sup> K. McK. Elderkin, 'Buttons and Greek Garments,' *Am. Journ. Arch.*, 1928, pp. 340-1.

<sup>3</sup> This example is unique in having markings on its under side. All the others are perfectly plain and flat below.

**902.** 27/C 3 A/A Mich. 4750.

Light green. D. 0.013 m. T. 0.0055 m.

**903.** 26/B 7 G/B Mich. 4746.

Olive green. D. 0.01 m. T. 0.0055 m.

**904.** 27/C 33 A/G Mich. 4736.

Opaque light green. D. 0.015 m. T. 0.008 m.

**905.** 28/203\*/L.

Opaque light green. D. 0.017 m. T. 0.007 m.

**906.** 27/C 53 B/L Mich. 4739.

Opaque bluish green. D. 0.024 m. T. 0.008 m.

**907.** 26/BC 76 B/G Cairo J 52784.

Opaque green. D. 0.023 m. T. 0.008 m.

**908.** 24/5048/AQ Mich. 5827.

Two examples, both opaque green. D. 0.022 m. and 0.018 m. T. 0.009 m. and 0.007 m.

**909.** 27/CA 19/Z Mich. 4752.

Yellow. Oval. G.D. 0.016 m. T. 0.006 m.

**910.** 28/204\*/E.

Brown. Oval, with sharp, not rounded edges. Pitted surface. G.D. 0.01 m. T. 0.0035 m.

**911.** 25/262/x Mich. 4737.

Light purple. Pitted surface. D. 0.008 m. T. 0.0055 m.

**912.** 26/B 43 A/G Mich. 4734.

Opaque light purple. Fragmentary. D. 0.016 m. T. 0.0055 m.

**913.** 28/C 84 A/U.

Opaque red. D. 0.019 m. T. 0.0065 m. .

**914.** 25/249/I Mich. 4745.

Opaque black. Pitted surface. D. 0.014 m. T. 0.006 m.

**915.** 25/262/x Mich. 4737.

Opaque black. Pitted surface. D. 0.015 m. T. 0.006 m.

**916.** 26/B 7 F/J Mich. 4741.

Opaque black. D. 0.019 m. T. 0.0055 m.

**917.** 26/B 11 G/E Mich. 4747.

Opaque black. Pitted surface. D. 0.021 m. T. 0.008 m.

**918.** 26/B 17 F/L Mich. 4755.

Two examples, both opaque black. D. 0.016 m. and 0.013 m. T. 0.007 m. and 0.0055 m.

**919.** 26/B 25 A/N Mich. 4748.

Opaque black. Hollow bored out near side.<sup>1</sup> Iridescence. D. 0.014 m. T. 0.0055 m.

<sup>1</sup> The explanation of this hollow, and of the similar markings on no. 926 below, is probably that they were once filled with insets of different coloured glass. Important examples of these disks, some with such insets still in position and others with holes from which the insets are missing were found at Silchester and are now in Reading.

920. 26/B 29 C/C Cairo J 52785.  
Opaque black. D. 0.019 m. T. 0.006 m.

921. 27/B 114 E/BI Mich. 4744.  
Opaque black. D. 0.018 m. T. 0.0065 m.

922. 27/C 29 A/OI Mich. 4751.  
Opaque black. D. 0.012 m. T. 0.006 m.

923. 27/CS 60/TI Mich. 4743.  
Opaque black. Milky surface. D. 0.016 m. T. 0.0055 m.

924. 27/CS 60/DII Mich. 4742.  
Opaque black. D. 0.022 m. T. 0.0075 m.

925. 28/B 119 A/A.  
Opaque black. D. 0.016 m. T. 0.0065 m.

926. 28/C 29 H/R.  
Opaque black. Two hollows bored out near side, not diametrically opposed. D. 0.019 m. T. 0.007 m.

927. 28/C 122 B/F.  
Opaque black. D. 0.018 m. T. 0.006 m.

2. *Polychrome*

928. 25/249/I Mich. 4745.  
Clear green background with opaque yellow circlets. Oval. Surface of green background pitted. G.D. 0.011 m. T. 0.005 m.

929. 24/5048/AQ Mich. 5827.  
Green and yellow millefiori as no. 928. D. 0.025 m. T. 0.008 m.

930. 26/B 3 N/K Cairo J 52783.  
Green and yellow millefiori as no. 928. D. 0.017 m. T. 0.008 m.

931. 28/C 88 C/O.  
Green and yellow millefiori as no. 928. D. 0.013 m. T. 0.006 m.

932. 25/5074/D Cairo J 52779.  
Clear green background with opaque yellow streaks, differing in both shape and shade from the circlets of the preceding examples. D. 0.014 m. T. 0.006 m.

933. 27/B 114 B/A Mich. 4735.  
Variegated black and grey. D. 0.01 m. T. 0.005 m.

934. 28/B 126\*/A.  
Clear green background with opaque red centre. D. 0.014 m. T. 0.006 m.

935. 28/130\*/C Mich. 5997. PL. XXI  
Clear blue background with flower design in centre; opaque white in the middle surrounded by a black circle outside of which is a ring of yellow petals. D. 0.008 m. T. 0.005 m.

936. 26/B 18 A/E Cairo J 52781.  
Opaque greyish green background with flower design; black with yellow petals. D. 0.011 m. T. 0.0055 m.

### 7. PIERCED BUTTONS

Several examples, of two distinct types, occurred: (i) a large, decorated variety, and (ii) a smaller one, undecorated. The use of each is uncertain. Type i cannot have been strung in a necklace, for otherwise its decoration would have been hidden. The type is listed by Eisen<sup>1</sup> as one of his varieties of button-beads: he does not, however, attribute to it the same use which he attributes to the unpierced varieties, but maintains that it was 'fastened on leather with a bronze brad.' Mrs. Elderkin<sup>2</sup> maintains that these, like the unpierced disks, H, were used as dress-fasteners, being affixed to the material by means of a cord or thong. But in this case, again, would not the dressmaker have preferred to employ a button with two or more holes and sew it on to the fabric? Eisen's explanation seems more probable, but in that case the word 'bead' which he uses is a misnomer, and he should rather have called it a 'decoration.'

But another use for these objects is suggested by the fact that very similar disks of glass are to be seen in place on glass stirring-rods (E).<sup>3</sup> Here they served the purpose of a stop to prevent the rod sinking too deeply into the bottle in which it was set. Others would call these objects spindle-whorls, but they are rather light for that purpose: in archaeology such an identification of pierced objects often seems but a last despairing attempt at the concealment of ignorance.

Similar disks with similar designs upon them are frequently met with in late Roman layers in Egypt, and examples may be seen in most museums. They do not occur in other provinces.

#### I. LARGE BUTTONS, CIRCULAR, WITH SEGMENTAL SECTION; LATERAL BORING

937. 26/B 8 C/L Mich. 5974.

PL. XXI

Dark purple; badly chipped.

D. 0.035 m. T. 0.009 m.

Inlaid decoration on convex side; opaque white cross in the angles of which are yellow circles with purple centres.

938. 26/B 12 L/SII Cairo J 52782.

Green; half missing.

D. 0.035 m. T. 0.008 m.

Inlaid decoration as on no. 937; opaque white arms forming a cross with arms made up of spirals of red, yellow, brown, and light blue; in the angles, yellow circles with brown centres.

<sup>1</sup> Eisen, *ibid.*, pp. 302 and 304, pl. ix, 17.

<sup>2</sup> Elderkin, *ibid.*, pp. 340-1.

<sup>3</sup> E.g., on an example from the Ransom collection in Cambridge (no. 23. 733) and on an example from Idalium, Cesnola, *Atlas*, iii, pl. lxxvi, 2.

939. 26/B 15 D/B Cairo J 52780.

Buff colourless; intact; frosted.

D. 0.037 m. T. 0.009 m.

Inlaid decoration as on no. 937; yellow arms forming a cross with arms made up of spirals of yellow, red, and colourless glass; in the angles, yellow circles with red centres.

940. 26/B 17 F/M Cairo J 52776 and Mich. 5972.

Two examples. Dark purple; intact.

D. 0.035 m. T. 0.008 m.

Inlaid decoration as on no. 937; yellow cross; in the angles, yellow circles with purple centres.

941. 26/B 17 F/M Mich. 5972.

Red, green, and opaque blue millefiori glass in no settled pattern; intact, but badly pitted.

D. 0.033 m. T. 0.009 m.

942. 26/B 18 F/AI Mich. 5973.

Pale green; chip missing, badly strain-cracked.

D. 0.041 m. T. 0.01 m.

Inlaid decoration on convex side; light blue arms forming a cross with yellow arms; in the angles, light blue circles with black centres.

943. 28/B 127\*/B.

Clear green; half missing.

D. 0.033 m. T. 0.008 m.

Inlaid decoration as on no. 942; opaque white cross; in the angles, circles with black centres and white and blue concentric rings outside.

944. 27/C 29 C/M Mich. 5975.

Clear green; intact.

D. 0.034 m. T. 0.012 m.

Inlaid decoration as on no. 942; round the central hole are three red circles with black centres.

Type ii may have been used for stringing on necklaces, not unlike the disks of glaze and shell which were used thus in earlier times.<sup>1</sup> Examples occur often in late Roman layers in Egypt,<sup>2</sup> but not, apparently, outside that country.

## II. SMALL BUTTONS, CIRCULAR WITH RECTANGULAR SECTION; LATERAL BORING

945. 27/213 C/Q Mich. 4740.

Green; intact.

D. 0.024 m. T. 0.0075 m.

Flat on one side, slightly convex on the other.

PL. XXI

<sup>1</sup> Petrie, *Amulets*, no. 110 d, pl. xv (shell, dyn. XXII), and Garstang, *El Arábah*, pls. xix (E 178) and xvii (E 255) (blue glaze, dyn. XVIII).

<sup>2</sup> E.g., four from Ehnasya are now in the Victoria and Albert Museum, no. 1187. 1904.

946. 27/213 c/Q Mich. 4740.

Green; intact.

D. 0.021 m. T. 0.0055 m.

Flat on both sides.

947. 27/c 54 B/J Cairo J 52777.

Light green; intact.

D. 0.02 m. T. 0.004 m.

Shape as no. 946.

948. 28/B 167 E/A.

Greenish yellow; intact.

D. 0.022 m. T. 0.004 m.

Shape as no. 946.

949. 28/cs 105/L.

Green; fragmentary.

D. 0.018 m. T. 0.005 m.

Shape as no. 946.

## K. DISKS STAMPED IN RELIEF

Two types occurred, one decorated on one side only, the other with a stamped design on each side. These disks belong to a large class of objects which have been found not only in Egypt, but also elsewhere in the Roman world, though the actual designs on these Karanis specimens do not seem to occur elsewhere. In the Coptic Section of the Kaiser Friedrich Museum<sup>1</sup> and in the British Museum<sup>2</sup> there are several examples of similar stamped disks, some of which have a loop for suspension while others have none. Kisa<sup>3</sup> also mentions both types and identifies them as merchandise marks, the former being tied on with string, the latter presumably affixed with some adhesive. To this same class of object belong the glass weights of Arabic times<sup>4</sup> and their forerunners of Byzantine date which bear heads, crosses, double triangles, and other designs. That all were used as merchandise marks is perhaps unlikely. Some may have been used as tokens instead of small coins, like the similar stamped disks of terra-cotta found in such large numbers at Palmyra and known as Palmyrene tesserae. Others may have been tickets for

<sup>1</sup> Wulff, nos. 1151 ff., p. 236 f., pl. lvi.

<sup>2</sup> Dalton, *Cat. Early Christ. Antiq. in B.M.*, nos. 697 ff., p. 137 f.; compare also examples in the de Clercq collection, de Ridder, nos. 664 ff., p. 284, pl. xxxii.

<sup>3</sup> Kisa, pp. 354 and 481.

<sup>4</sup> Examples in the Askren collection, nos. 5321-5 (Byzantine) and 5236-33 (Arab); compare Casanova, *Cat. des pièces de verre de la coll. Fouquet* (*Mém. de la Miss. franç.*, vi, no. 3) and numerous other publications.

games, shows, and the like; while the looped examples were sometimes, doubtless, strung as amulets.

1. *Opaque red glass*

Five examples occurred, all exactly similar.

950. 25/278 D/C Cairo J 52796.

25/284 B/D Mich. 4764.

25/5074/D Cairo J 52779.

28/131\*/Z.

28/C 87 K/D.

D. 0.01 m., flat on one side and decorated on the other with a helmeted male head stamped in relief.

2. *Deep purple transparent glass*

Only one example occurred.<sup>1</sup>

951. 27/CA 20/M Mich. 4762.

D. 0.01 m., stamped in relief on both sides: *ob.* Female head: *rev.* Eagle with outspread wings.

L. FRAGMENTS OF INLAY

The commonest kinds of inlay discovered at Karanis were monochrome or millefiori sections of geometrical patterns, but there were besides a few fragments of figure or floral scenes and one or two other miscellaneous pieces. For convenience of reference four sub-groups have been arranged:

1. Fragments of patterns with more than one piece of inlay still preserved in combination;
2. Single pieces of millefiori and polychrome glass;
3. Single pieces of monochrome glass;
4. Shaped fragments of figure or floral patterns, and other miscellaneous pieces.

It should be borne in mind that fragments listed under (1) may include pieces of any one or of more than one of the other three groups. All the pieces in groups 1-3 have been made in a roller-mould,<sup>2</sup> those in group 4 in an ordinary casting-mould.

<sup>1</sup> There is an unintentional blob of light blue glass on one side.

<sup>2</sup> The glass was poured into a flat pan and rolled out. That this technique was used is apparent from the glossy nature of the upper side (where it was rolled), and the dullness of the under side (where it lay on the bottom of the pan). For other examples of this technique compare the fragments of window-glass, M.

Most if not all of the fragments in the first three groups come from decorative panels on boxes, trays, or pieces of furniture. The first three in group 4 belong to inlay plaques for wall-decoration, while the remaining three pieces in that group are of doubtful use, and may not be inlays at all.

Fragments of inlay of all these types, and of others in addition, are frequent on every Roman site in Egypt, but adequate publication of such finds is so rarely met with that it is impossible to attempt a full comparison between the Karanis specimens and those found elsewhere. On the other hand, the present pieces are not complete enough or important enough to render justifiable an attempt at classification of Roman glass inlay-work on their basis.

Most of this inlay was made at Alexandria—the millefiori fragments certainly were—and as similar pieces with similar patterns are frequently found all over the Roman world,<sup>1</sup> there must have been a very large export trade. Some of it was exported already made up into decoration on boxes, &c.: that it was also sent aboard in bars for sale to glass-makers in other lands is suggested by finds on the sites of several western glass-factories.<sup>2</sup>

*1. Fragments of patterns with more than one piece of inlay still preserved in combination*

952. 28/c 59 L/B Mich. 5999.

PL. XXI

Fragment of inlay design: triangles, bluish green, yellow and red, in a frame of opaque white drawn glass, the whole built up on a background of sand and pitch.<sup>3</sup> Four triangles preserved, forming two squares. The white frame is in a very crumbly state owing to weathering.

Dimensions of triangles 0.01 m.  $\times$  0.01 m.  $\times$  0.015 m.

953. 27/c 51 J/G Cairo J 52805.

Fragment of inlay design: triangles, greenish blue, red, and white, in a frame of opaque white drawn glass, the whole built up on a background of sand and pitch.

Six triangles preserved forming two squares and two half-squares.

Dimensions of triangles 0.022 m.  $\times$  0.022 m.  $\times$  0.031 m.

954. 27/c 4 J/A Mich. 4757.

PL. XXI

Fragment of inlay design: slightly curved, parallel bands of glass; one broad band, greenish blue, outside three narrow bands, yellow, black, and yellow respectively; the whole on a background of sand and pitch.

L. of fragment 0.075 m.

<sup>1</sup> Kisa, pp. 501–8, figs. 169–85.

<sup>2</sup> *Ibid.*, p. 508.

<sup>3</sup> For this use of pitch or bitumen in inlay-work see *Script. Hist. Aug.* xxix (Quadrigae tyrannorum). 3. 2: vitreis quadraturis bitumine aliisque medicamentis insertis domum instruxisse perhibetur.

955. 28/C 122 B/G Mich. 6000.

PL. XXI

Fragment of inlay design: large rectangular piece of colourless bubbly glass beside a narrow band of opaque sky blue glass, much decomposed; the whole on a background of sand and pitch, which has been coloured red beneath the colourless slab, but which is elsewhere left plain.

Dimension of colourless slab 0.024 m. x 0.044 m.

*2. Single pieces of millefiori and polychrome glass*

956. 28/242\*/LII Cairo J 54771.

PL. XXII

Strip of millefiori inlay, fragmentary: opaque white background upon which is a row of equidistant rosettes; the first and third each have eight red petals surrounding a yellow circle with green centre, the second and fourth are similar but with blue petals.

L. of fragment 0.028 m. W. 0.0065 m.

957. 26/B 56 A/K Cairo J 52795 B.

PL. XXII

Square of millefiori inlay, fragmentary: transparent purple background with polychrome floral pattern; the central flower red, white, and blue; the trefoils yellow; and the palmettes yellow, red, and blue.

Side of square 0.015 m.

958. 26/BS 2/F Mich. 6002.

PL. XXII

Strip of millefiori inlay, fragmentary: opaque turquoise blue background with polychrome floral pattern; the flower-buds and the central part of the stalks opaque red; the leaves and the outside part of the stalks opaque yellow; the outlines and the stems of the flowers deep purple.

L. 0.018 m. W. 0.015 m.

959. 27/243/x Mich. 6001.

PL. XXII

Strip of inlay in two colours, broken off at both ends: centre portion purple, outsides opaque white.

L. 0.035 m. W. 0.006 m.

960. 28/C 67 K/G Cairo J 54770.

Slab of millefiori inlay, fragmentary: made of alternating sections of two sticks of millefiori, (a) white opaque flowers with sky blue petals and centres, and (b) yellow-petaled flowers in brown background.

L. 0.03 m. W. 0.015 m.

961. 25/5079 c/b Mich. 6006.

PL. XXII

Slab of millefiori inlay, broken off at both ends: transparent green background with opaque yellow circlets in no settled pattern.

L. 0.048 m. W. 0.018 m.

962. 27/C 13 C/Q Mich. 6003.

Slab of millefiori inlay, fragmentary: colours and design as no. 961. W. 0.026 m.

963. 26/BC 57 E/K Mich. 6004.

Slab of millefiori inlay, as no. 961. W. 0.022 m.

964. 25/249/1 Mich. 4745.

Slab of millefiori inlay, as no. 961. W. 0.017 m.

965. 25/314 D/E Mich. 6007.

Slab of millefiori inlay, as no. 961. W. 0.023 m.

966. 25/250/k Mich. 6008.

Slab of millefiori inlay, as no. 961. Pitting begun. W. 0.021 m.

967. 26/B 49/c Mich. 6005.

Slab of millefiori inlay, as no. 961. Pitting far advanced. W. 0.034 m.

968. 25/250/k Mich. 6008.

Slab of millefiori inlay, broken off on one side: dark green glass with light green patches, both transparent.

W. at end 0.021 m.

969. 28/B 108 C\*/P.

Slab of millefiori inlay, triangular with rough edges: colour design as no. 968.

Dimensions of triangle 0.029 m.  $\times$  0.034 m.  $\times$  0.034 m.

970. 28/C 88 A/F.

Slab of millefiori inlay, triangular, fragmentary, with traces of pitch adhering to edges: opaque green with faintly yellow mottling.

Dimensions of triangle 0.075 m.  $\times$  0.055 m.  $\times$  0.055 m.

### 3. *Single pieces of monochrome glass*

971. 27/cs 11/A Mich. 6009.

PL. XXII

Slab of inlay, triangular, with rough edges: opaque white.

Dimensions of triangle 0.037 m.  $\times$  0.026 m.  $\times$  0.026 m.

972. 25/4012 B/I Mich. 6013.

Slab of inlay, fragmentary: opaque turquoise blue. G.W. 0.013 m.

973. 27/cs 60/W Mich. 6010.

Slab of inlay, fragmentary: translucent turquoise blue. G.W. 0.039 m.

974. 27/242 B/CI Mich. 6011.

Slab of inlay, as no. 973. Bad flaw on upper side, caused by a broken bubble. G.W. 0.041 m.

975. 25/262/Q Mich. 6012.

Slab of inlay, as no. 973. G.W. 0.024 m.

976. 25/249/I Mich. 4745.

Slab of inlay, as no. 973. G.W. 0.018 m.

977. 25/249/I Mich. 4745.

Slab of inlay, fragmentary: translucent dark green, but badly pitted. G.W. 0.035 m.

978. 25/249/K Mich. 6014.

Slab of inlay, fragmentary: colour as no. 977. G.W. 0.029 m.

### 4. *Shaped fragments of figure or floral patterns and other miscellaneous pieces*

979. 27/B 110 B/C Cairo J 52799.

PL. XXII

Fragment of headdress of inlaid figure: bichrome with alternate horizontal bands of opaque blue and opaque yellow. The convex curve is slightly bevelled.

H. 0.014 m.

980. 25/281 B/L Mich. 6018.

PL. XXII

Half of rosette for inlay, opaque red, with circular centre-piece of opaque turquoise blue inlaid within it: rosette flat on under side and slightly convex on upper side with petals (originally eight?) moulded in relief upon it; centre-piece flat on both sides with a bevelled edge to enable it to fit into rosette; traces of black adhesive (pitch?) in hollow in rosette where centre-piece was fixed.

D. of rosette 0.04 m. D. of centre-piece 0.012 m.

981. 25/314 B/C Cairo J 52798 B.

PL. XXII

Leaf or bud for inlay, opaque red: under side flat, upper side convex, edges bevelled and tapering to under side.

H. 0.023 m. W. 0.01 m.

982. 26/BS 1/U Mich. 6016.

PL. XXII

Triangular slab, equilateral, fragmentary, greenish colourless: under side flat, upper side flat with bevelled edges, and three concentric cut circles in centre, surface polished all over.

L. of side 0.035 m.

983. 25/5084 B/D Mich. 6017.

Square slab, opaque light green: under side flat, upper side flat with two opposite edges bevelled, surface polished all over.

L. of side 0.013 m.

984. 28/C 36 K/Q Mich. 6015.

PL. XXII

Oval disk with oval hole in centre, fragmentary, made up of four concentric bands of coloured glass—opaque white, opaque light green, opaque dark green, and translucent purple, reading inward. Roller-moulded. Perhaps a piece of inlay.

Maj. Ax. 0.063 m. Min. Ax. 0.053 m.

## M. FRAGMENTS OF WINDOW-GLASS

The following fragments of coarse green glass were found, all of which must have been made in a roller-mould, for they not only show the two surfaces, one glossy and one dull, typical of that process, but also a bit of the rounded section characteristic of the edges of roller-moulded slabs. They are therefore exactly similar to the fragments of glass which, when found on western Roman sites, are identified as window-glass.<sup>1</sup> But amongst all the thousands of complete window-frames found in houses at Karanis, not one showed any signs of having been glazed: there was no trace of a groove either in the wooden cross-pieces or in the bricks of the wall. It seems, therefore, highly doubtful whether these Karanis fragments were really window-glass, but until definite proof of some other usage is brought to light, such a label forms a convenient one, supported as it is by

<sup>1</sup> For full treatment of the subject see Kisa, pp. 363–5, and Lamm, *Samarra*, pp. 124–5, and for references to window-glazing in ancient writers, Trowbridge, *Philol. Studies*, pp. 186–90.

evidence from Pompeian<sup>1</sup> and other western finds. It is possible that the Karanis fragments, and also, of course, many of those found elsewhere, were used not for window-glazing, but for other purposes, e.g., the glazing of metal lanterns.<sup>2</sup> Decorated plaques from Egypt made of this same green roller-moulded glass are also known, notably a square panel found by Petrie at Tanis which bears the signs of the zodiac in a circular design painted and gilded upon it.<sup>3</sup>

985. 24/169 AS/D Mich. 5453.

PL. XXII

Bluish green; fragmentary; no weathering; full of bubbles.

0.06 m.  $\times$  0.06 m. A.T. 0.0038 m.

Roller-moulded fragment, glossy on upper side, dulled on under side: rounded edge.

Fabric 9.

986. 24/5016 H/E Mich. 5812.

Fragment as no. 985. 0.025 m.  $\times$  0.03 m. A.T. 0.004 m.

987. 24/5043 A/K Mich. 5760.

Light olive green, otherwise as no. 985. 0.025 m.  $\times$  0.045 m. A.T. 0.0065 m.

988. 28/C 108 B/K Mich. 6245.

Green, otherwise as no. 985. 0.045 m.  $\times$  0.07 m. A.T. 0.006 m.

Three other fragments of similar glass were found which were almost certainly made in a roller-mould. Though none preserves traces of the original edge of the slab, they all have the typical glossy and dulled surfaces.

989. 24/5028 A/H Mich. 5801.

Buff colourless, full of bubbles. 0.055 m.  $\times$  0.025 m. A.T. 0.0028 m. Fabric 9.

990. 24/124 B/F Mich. 5880.

Olive green, otherwise as no. 989. 0.02 m.  $\times$  0.03 m. A.T. 0.005 m.

991. 24/5055/H Mich. 5885.

Green, iridescent, full of bubbles. 0.03 m.  $\times$  0.035 m. A.T. 0.006 m. Fabric 9.

## N. MISCELLANEOUS OBJECTS AND FRAGMENTS OF UNCERTAIN USE

### *Applied medallions*

Three examples occurred of small medallions bearing rosettes stamped upon them in relief. They had been originally affixed to a vase. Similar medallions, broken off vases, are not infrequently

<sup>1</sup> A. Mau, *Pompeii* (trs. F. W. Kelsey), p. 273.

<sup>2</sup> See Kisa, p. 353. Glazed lanterns are mentioned by Isidorus of Seville (*Etymologiae sive Origines*, xx. 10. 7).

<sup>3</sup> Now in the Egyptian Department of the British Museum, no. 29137; Petrie *Tanis*, i, 48-9, and *British Museum Guide to Fourth &c. Egyptian Rooms* (1922), p. 88.

found in Egypt. Edgar publishes eight such (nos. 32762-6 and 32768-70). These latter were affixed singly at the base of the handle of a flask—according to Kisa,<sup>1</sup> for apotropaic purposes. The rosettes, however, could have no apotropaic significance, and must have been merely decorative. They were probably not used singly but in groups, as they are on a barrel-shaped beaker found at Cologne and now in Bonn.<sup>2</sup>

992. 24/5028 E/I Mich. 5887.

PL. XXII

Colourless with greenish tinge; frosted; bubbly.

D. 0.023 m.

A solid coil of similar glass has been added to a flask, and upon this coil, while warm, a rosette has been stamped in relief. The rosette occupies the whole face of the coil. Fabric 2.

993. 26/BS 1/J Mich. 6149.

27/CS 52/TII Mich. 6220.

Two examples as no. 992, green. Fabric 5.

*Fragment of a cylindrical object pierced longitudinally with a rectangular boring*

At Dendereh, in the animal-catacombs, which were in use from dynasty XVIII to Roman times, Petrie<sup>3</sup> found a collection of fragments of similar objects, some of opaque blue and some of opaque red glass. He explains them as having been fixed in rows on metal rods, perhaps to be used as a stem for a candelabrum. Complete examples are not rare in museums.<sup>4</sup>

994. 25/270 A/B Mich. 4759.

PL. XXII

Opaque dark blue; fragmentary.

L. 0.031 m. T. of side 0.012 m.

Fragment of cylinder; cylindrical outside with flat ends; boring rectangular.

*Two fragmentary beads of doubtful use*

Both of these seem rather too large to have been ordinary necklace beads. Perhaps they were harness trappings.

995. 27/C 62 G/O Cairo J 52789.

PL. XXII

Opaque green streaked with opaque red; broken at one end.

<sup>1</sup> Kisa, pp. 479-80, figs. 36a, 93, and 201.

<sup>2</sup> *Ibid.*, p. 438, fig. 140.

<sup>3</sup> Petrie, *Dendereh*, pp. 34-5.

<sup>4</sup> There are, e.g., specimens in Oxford, nos. 1887. 2491 (from Qantara) and 1889. 909. One from Elephantine is in the Egyptian Museum, Berlin (no. 18377).

L. of fragment 0.03 m. D. 0.02 m. T. 0.006 m.

Fragment of bead; cylindrical, with spiral ribs outside, and probably made by coiling a drawn-glass thread; hole cylindrical.

996. 27/B 103/DII.

PL. XXII

Opaque red; nearly complete.

H. 0.033 m. D. 0.036 m.

Bead; piriform with cylindrical hole.

*Fragments of frit*

Two fragments of glass, both brownish yellow in colour, and both apparently of fabric 4, were found, which are undoubtedly fragments broken off a frit or first fusion of a batch. They came from reconstructed Constantinian houses, one of them occurring in B 136 and the other not far away from it in B 163. They are not, in themselves, sufficient to prove extensive glass-manufacturing at Karanis, but they do suggest that at least some glass was manufactured on the spot, and the fact that they resemble table ware *b* (fabric 4) very closely in colour and appearance is important in that connexion.<sup>1</sup>

997. 28/B 136 A\*/K Mich. 6019.

998. 28/B 163 A\*/G Mich. 6020.

*Fragment of a stand (?)*

999. 24/109 C/N Mich. 5860.

PL. XXII

Yellow; fragmentary; very few bubbles.

W. of fragment 0.037 m. H. 0.015 m. A.T. 0.007 m.

Fragment of centre of object, fractured on all edges: upper side slightly concave with a moulded decoration of dots and concentric circles within squares, the hollows between which (i.e., the black portions in the plate) are filled with a yellow substance, perhaps paint; under side dulled and slightly convex, with remains of projections (the arrows in the plate indicate their position), which seem to have been cylindrical with a hole down the middle and which apparently served as toes though they are not centred with reference to the design of the upper side.

Perhaps fabric 5.

*Fragment of flower-shaped neck of bottle (?)*

1000. 26/B 4 D/R Cairo J 52788.

PL. XXII

Colourless with green tinge; broken off at bottom; material fair.

H. 0.041 m. G.D. 0.033 m. T. of wall 0.0055 m.

Rim rounded. Sides convex with greatest diameter toward bottom of extant fragment. On exterior, two horizontal wheel cuts just above greatest diameter. No further decoration.

Fabric 1.

<sup>1</sup> See p. 39 above.

*Oval object made of two layers of glass, use unknown***1001.** 27/C 35 A/N Mich. 4756.

Greenish; intact.

Maj. Ax. 0.021 m. Min. Ax. 0.014 m. T. 0.007 m.

Two oval pieces of glass of segmental section, with sharp edges, stuck together with their flat sides inward.

*Base of test-tube (?)***1002.** 24/42/1 Mich. 5448.

Colourless with greenish tinge; broken off at top; material good.

D. 0.02 m. T. 0.0025 m.

Fragment of cylindrical tube in the shape of a modern test-tube with rounded base, sealed up by heating in flame.

Fabric 1.

*Fragment of a solid stem<sup>1</sup>***1003.** 24/5021 A/J Mich. 5764.

Yellowish brown; dulled surface.

L. 0.05 m. G.D. near base 0.015 m.

Solid stem broken off a bowl-shaped body. Sides faintly concave near junction with body and widening thence toward base.

<sup>1</sup> Both in Syria and in Egypt lamp-glasses in the shape of a bowl on a footless stem have been found on late Byzantine sites; see Crowfoot and Harden, p. 203. This fragment might very well be a stem broken off one of these, but in view of the countless complete and fragmentary examples of conical lamp-glasses that have been found at Karanis it seems unsafe to assume, on the evidence of this one example alone, that stemmed lamps were also in use at Karanis. It has therefore been classed here amongst the uncertain fragments.

## APPENDIX

### PREVIOUS FINDS OF GLASS AT KARANIS

MUCH more than half of the Roman glass received into the Cairo Museum since care has been taken to record the provenance of specimens (that is, since about 1900) comes from *sebbakh*-digging at Karanis. And, besides what is preserved in Cairo, the Roman portion of the large collection of Egyptian glass brought together during many years' residence in the Fayûm by Dr. D. L. Askren and now preserved in Ann Arbor is considered by Dr. Askren to be of similar origin.

A few of the Cairo pieces were published in Edgar's catalogue,<sup>1</sup> and more were published by Wainwright in three separate articles,<sup>2</sup> but the remainder of this glass from Karanis, including the whole of the Askren collection, is as yet unpublished. It will be useful, therefore, to collect all this material into an appendix, giving a list of the whole of it, and a fuller description, with references to parallel types in the Catalogue, of any piece that has not already been published elsewhere.

### LIST OF GLASS FROM KARANIS, IN CAIRO

(Groups of glass found together are bracketed)

J 37783 (Edgar 32782)	..IX A	41061 41069 41070 (Received 1909) 41881 a, b, c	..IX A
37784 (Edgar 32781)	..XI A		..IX B
37785 (Edgar 32780)	..VI A		..IV A
37786 (Edgar 32778 and 32779)	..III A		..II A
37787 (Edgar 32783)	..IX B	43344 a, b 43345 a, b, c, d, e	..III B
37788 (Edgar 32787)	..IX B		..VI B
37933 (May 1905)	..III A	43804	..?
39621	..IX A	43805	..IX A
40444	..IX B	43806	..?
40445	..VII A	43807	..III A
40446	..?	43808	..III A
40447	..VI A	45765 ( <i>Sebbakh</i> , 16 Sept. 1916)	..XII C
40448	.. "	45766	..X B
40449	.. "	45767	..X
40450	.. "	45768	..XII C
40451	.. "	45769	..XII B

<sup>1</sup> C. C. Edgar, *Graeco-Egyptian Glass*, Cat. gén. des antiq. ég. du Musée du Caire, nos. 32778-83, 32787.

<sup>2</sup> G. A. Wainwright, *Le Musée Égyptien*, iii, 64 ff.; *Annales*, xxiv, 110 ff., and xxv, 97 ff.

45770 (Sebbakh, 16 Sept. 1916)	..VIII C	46479 (Sebbakh, 5 Oct. 1919)	..XI A
45771 "	..IX B	46480 "	.."
45772 "	..IX B	46481 "	..XII B
45773 "	..VIII C	46482 "	..XII C
45774 "	..III A	46483 "	..VIII A
45775 "	..VII A	46484 "	..XII C
45776 "	..XII C	46485 "	..VIII C
45777 "	..XI C	47078	..I B
45778 "	..IX A	47092 a	Wainwright, <i>Le Musée Egyptien</i> , iii, 64 ff.
46439 (Sebbakh, 5 Oct. 1919)	..III A		..VI A
46440 "	.."	b	.."
46441 "	.."	c	.."
46442 "	.."	d	.."
46443 "	.."	e	.."
46444 "	.."	f	..VIII B
46445 "	.."	g	..III A
46446 "	.."	h	..I A
46447 "	.."	i	.."
46448 "	.."	47094 a	..IX A
46449 "	.."	b	.."
46450 "	.."	c	..VIII B
46451 "	.."	d	..III A
46452 "	.."	e	..IV B
46453 "	.."	47095 a	..IX A
46454 "	..IV B	b	.."
46455 "	.."	c	..VIII B
46456 "	..II A	d	..XIII
46457 "	.."	47096 a	..IX B
46458 "	.."	47097 a	..IX A
46459 "	.."	b	..IX B
46460 "	..VI B	c	.."
46461 "	.."	d	..XII C
46462 "	.."	e	..VIII B
46463 "	.."	f	..IX B
46464 "	.."	47098 a	..III A
46465 "	.."	g	.."
46466 "	..VI A	h	.."
46467 "	..VI C	i	.."
46468 "	..VI C	j	.."
46469 "	..I A	47098 a	..IX A
46470 "	.."	b	.."
46471 "	.."	c	.."
46472 "	.."	d	.."
46473 "	.."	e	..VIII B
46474 "	.."	f	..XIII H
46475 "	..IX B	47099 a	..IX A
46476 "	..IX A	b	.."
46477 "	..X B	c	.."
46478 "	..XI B	d	.."
		e	.."

47099 f	Wainwright, <i>Le Musée Egyptien</i> , iii, 64 ff.	..III A	47105 b	Wainwright, <i>Le Musée Egyptien</i> , iii, 64 ff.	..IX A
g	"	"	c	"	"
h	"	"	d	"	"
i	"	"	e	"	"
47100 a	"	"	f	"	"
b	"	"	g	"	"
c	"	"	h	"	"
d	"	"	i	"	"
47101 a	"	"	j	"	"
b	"	"	k	"	"
c	"	"	l	"	"
d	"	"	47116 a	Wainwright, <i>Annales</i> , xxv, 102.	..X B
e	"	"	b	"	"
f	"	"	c	"	"
g	"	"	47263	<i>Ibid.</i> xxiv, 116	..IX A
h	"	"	47264	"	..III A
i	"	"	47265	"	..XI C
j	"	"	48218		..IX B
47105 a	"	"			

LIST OF GLASS FROM KARANIS (?), IN THE ASKREN COLLECTION  
MUSEUM OF CLASSICAL ARCHAEOLOGY, UNIVERSITY OF MICHIGAN

Mich. 5001..I B	Mich. 5026..III A	Mich. 5126..IX A
5002..I A	5027.. "	5127.. "
5003.. "	5028..IV B	5128.. "
5004.. "		5129.. "
5005.. "	5082..VI B	5130.. "
5006.. "	5083.. "	5131.. "
5007.. "	5084.. "	5132.. "
5008..II A	5085.. "	5133.. "
5009.. "	5086..VI A	5134.. "
5010.. "	5087.. "	5135.. "
5011.. "	5088.. "	5136.. "
5012.. "	5089.. "	5137.. "
5013.. "	5090.. "	5138.. "
5014.. "	5091.. "	5139.. "
5015.. "	5092.. "	5140.. "
5016..III A	5093.. "	5141.. "
5017.. "	5094.. "	5142.. "
5018.. "		5143.. "
5019.. "	5119..VII A	5144.. "
5020.. "	5120..VI D	
5021.. "	5121..VIII A	5149..IX B
5022.. "	5122.. "	
5023.. "	5123.. "	
5024.. "	5124.. "	5151..IX B
5025.. "	5125.. "	5152.. "

## ROMAN GLASS

Mich. 5155..IX B	Mich. 5195..XIII E	Mich. 5242..IX A
5156..XI C	5196.. "	5243.. "
5157..XI A	5197.. "	5244.. "
5158.. "	5198.. "	5245.. "
	5199.. "	5246.. "
5161..XII C	5200.. XIII F	5247.. "
5162..XII B	5201.. "	5248.. "
5163.. "	5202.. "	5249.. XIII H
5166..XIII A	5203.. "	5250.. XIII E
5167.. "	5204.. "	5251.. "
5168.. "	5205.. "	5252.. XIII F
5169.. "	5206.. "	5253.. "
5170.. "		5254.. "
5171.. "	5213.. V A	5255.. "
5172.. "	5214.. "	5256.. "
5173..XIII B		5257.. "
5174.. "	5218.. XI A	5258.. XIII G
5175.. "	5219.. IX B	5259.. "
5176..XIII C	5220.. "	
5177.. "	5221.. "	5272.. X B
5178.. "	5222.. "	5273.. "
5179.. "	5223.. "	5274.. "
5180.. "	5224.. "	5279.. X B
5181.. "	5225.. "	5280.. "
5182.. "	5226.. "	5281.. "
5183..XIII D	5227.. "	5298.. XII C
5184.. "	5228.. "	5299.. IX B
5185.. "	5229.. "	5300.. "
5186.. "		5301.. "
5187..XIII E	5231.. IX A	5302.. "
5188.. "		5303.. "
5189.. "		5304.. "
5190.. "	5237.. IX B	5305.. "
5191.. "	5238.. IX A	5306.. "
5192.. "	5239.. "	5307.. "
5193.. "	5240.. "	5308.. "
5194.. "	5241.. "	

CLASSIFIED CATALOGUE OF HITHERTO UNPUBLISHED GLASS  
FROM KARANIS, IN CAIRO

## CLASS I. DISHES AND PLATES

## A. Oval dishes on base ring

## I. Folded rim, outward

## (a) Base ring with post technique

1. True base ring, type as nos. 1-14

J 46469. Dark green, fabric 5.

## (b) Base ring with pontil technique, type as nos. 17-26

J 46470. Yellowish brown, fabric 4.

J 46471.<sup>1</sup> Pale greenish yellow, fabric 4. H. 0.052 m. Maj. Ax. 0.223 m.

46472. Yellow, fabric 4.

46473. Dark green, fabric 4. H. 0.043 m. Maj. Ax. 0.187 m.

46474. Dark green, fabric 4. H. 0.045 m. Maj. Ax. 0.205 m.

B. Circular plates on base ring

No parallel in Catalogue.

J 47078. Fig. 1, b.

Colourless with greenish tinge; intact; no weathering; good glass, some impurities.

H. 0.03 m. D. 0.358 m. A.T. 0.002 m.

Rim thickened by folding. Sides slope gently downward to base ring. Base ring vertical and a true ring with post technique. Thin thread on outside, about 0.015 m. from lip.

Fabric 1.

CLASS II. SHALLOW BOWLS

A. With base ring

I. Folded rim, outward

(b) Base ring with pontil technique

1. Almost rectangular contour, type as nos. 89-106

J 46456. Yellow with green and purple tints, fabric 4. H. 0.045 m. D. 0.145 m.

46457. Purple, fabric 6. H. 0.045 m. D. 0.148 m.

2. Wide obtuse-angled contour, type as no. 107

J 46458. Yellow, fabric 4. H. 0.055 m. D. 0.21 m.

41881 a, b, c and 46459. Not traceable in 1928, but from the description in the inventory they appear to belong to II A i.

CLASS III. DEEP BOWLS

A. With base ring

I. Folded rim, outward

(a) Base ring with post technique, type as nos. 221-3

J 46444. Dark green, fabric 5. H. 0.08 m. D. 0.142 m.

46445. Green, fabric 5.

46451. Brownish yellow, fabric 5. H. 0.085 m. D. 0.14 m.

(b) Base ring with pontil technique

2. Convex-sided body, type as nos. 235-6

J 43807. Clear green, fabric 4.

43808. Pale greenish yellow, fabric 4.

II. Folded rim, inward

(a) Base ring with post technique, type as nos. 237-41

J 46440. Yellowish brown, fabric 5. H. 0.075 m. D. 0.155 m.

46446. Greenish colourless, fabric 3. H. 0.066 m. D. 0.115 m.

46447. Dark green, fabric 5. H. 0.065 m. D. 0.133 m.

<sup>1</sup> On this example there are traces of post technique as well.

## III. Rounded rim

## (a) Base ring with post technique, type as nos. 246-55

Nos. 46452-3 have small pad bases, whereas all the others, and all those listed in the Catalogue, have true base rings.

J 37933 a, b. Two examples, yellowish brown, fabric 5. H. 0.09 m. D. 0.20 m.

46439. Brown, fabric 5. H. 0.065 m. D. 0.165 m.

46441. Green, fabric 5.

46442. Dark green, fabric 5. H. 0.073 m. D. 0.153 m.

46443. Light brown, fabric 5.

46448. Yellowish green, fabric 5. H. 0.065 m. D. 0.125 m.

46449. Yellow, fabric 5. H. 0.06 m. D. 0.113 m.

46450. Yellow brown with purple streaks, fabric 5. H. 0.06 m. D. 0.12 m.

46452. Yellow brown, fabric 3. H. 0.065 m. D. 0.12 m.

46453. Dark olive green, fabric 3. H. 0.067 m. D. 0.127 m.

45774. Not traceable in 1928, but from the description in the inventory it appears to be a variant type of division III with a cut-out in the side just below the rim (compare the bowl on stem, IV B, no. 358).

## B. With rounded base

## II. Unworked rim, with constriction just below

## (b) Coloured wares

## 2. Horizontal wheel incisions, type as nos. 329-30

J 43344 a, b. Fig. 2, d. Yellowish green, fabric 5. H. 0.04 m. D. 0.125 m. Three groups of incisions at greatest diameter, two groups in centre of base.

## CLASS IV. BOWLS ON STEM

## A. Shallow bowls

With convex sides, type as no. 356

J 41070. Dull brown, fabric 4. H. 0.10 m. D. 0.10 m.

## B. Deep bowls

With folded rim and bell-shaped contour, type as nos. 228 ff. in class III, but on a stem

J 46455.

Purple with yellowish brown streaks; intact; no weathering; bubbly.

H. 0.085 m. D. 0.12 m. A.T. 0.0015 m.

Hollow rim, folded outward and downward. Sides bent outward and then again upward at top, forming a shelf inside the rim; below this they slope inward to horizontal bottom. Stem thick and formed by twisting. Wide concave foot flattened with modelling tool. Criss-cross slanting impressions on upper side. Pontil technique.

Fabric 6.

With rounded rim, type as nos. 246 ff. in class III, but on a stem

J 46454.

Dark green; intact; no weathering; very bubbly, with impurities.

H. 0.053 m. D. 0.093 m. A.T. 0.0025 m.

Solid rim bent out sharply from sides at top and ending in a swelling above and below. Straight sides tapering from rim to bottom. Bottom flat. Very short stem formed by twisting. Base outplayed and flat below; pontil technique. Fabric 5.

## CLASS VI. CONICAL LAMPS

## A. Solid-pointed base

II. Rounded rim, pontil technique. No decoration, type as nos. 449-54

J 40447. Dark green, fabric 5. H. 0.11 m.

40448-51. Four others, as 40447 exactly.

46466. Yellow, fabric 4. H. 0.118 m.

## B. Hollow, flattened base

I. Unworked rim, no pontil technique

(a) Wheel incisions, type as nos. 455-6

J 46464. Yellowish colourless, fabric 3. H. 0.21 m.

46465. Brown, fabric 5. H. 0.135 m.

(b) Wheel incisions and blue blobs, type as nos. 457-63

J 43345 a-e. Five examples. Yellowish green, fabric 5.

a. Horizontal zigzag thread flanked by group of wheel incisions above and below.

b. Frieze of blue blobs in  formation, repeated twice. The frieze flanked by a group of wheel incisions above and below.

c. Horizontal zigzag thread, and above it, set in the angles, three large blobs alternating with triangular group of three small ones, each repeated three times. The whole flanked by a group of wheel incisions above and below.<sup>1</sup>

d, e. Not traceable in 1928.

46460. Yellowish green, fabric 5. Frieze of blue blobs in  formation, repeated twice. The frieze flanked by a group of  wheel incisions above and below.

46461. Yellowish green, fabric 5. Horizontal row of sixteen blue blobs divided into two groups of eight by two larger blobs diametrically opposed. Above, one group of wheel incisions, below, two groups.

46462. Yellowish green, fabric 5. As 46461, but only one group of incisions below blobs.

46463. Yellowish green, fabric 5. As 46460, but only seven blobs in each triangle.

## C. Solid base and base coil

II. Rounded rim; pontil technique. Decoration of trailed-on threads, type as nos. 464-5

J 46467. Yellow with green coil, fabric 4. H. 0.19 m. Spiral thread of similar glass near rim.

46468. Yellow with similar coil, fabric 4. H. 0.20 m. Spiral thread as on 46467.

<sup>1</sup> The lower line of wheel incisions cuts across the lower angles of the zigzag, showing that the incisions were made after the blobs were fused in.

## CLASS VII. DRINKING CUPS AND GOBLETS ON STEM

## A. Cups

## I. U-shaped body

(a) Without decoration, type as nos. 479-81

J 40445. Dull greyish yellow, fabric 4.

(b) With trailed-on threads, type as nos. 482-7

J 45775. Greenish yellow, fabric 4. One horizontal thread round centre of body.

## CLASS VIII. JARS

## A. Deeply concave neck with openwork zigzag coil; bulbous body

## II. Pad base

1. Plain bulbous body, type as nos. 494-6

J 46483. Dark green, fabric 5. H. 0.11 m. Single horizontal coil on neck.

## C. 'Poppy-head' type with small constricted neck and bulbous body

## I. Pad base

(b) Rounded rim with two coil handles, type as nos. 509-10

J 45770. Yellow, fabric 4. H. 0.10 m. Spiral of thin threads round body at greatest diameter.

46485. Yellow, fabric 4. H. 0.107 m. Spiral threads on neck and zigzag coil round body at greatest diameter (as on no. 510).

## II. Stemmed base, type as no. 511

J 45773. Not traceable in 1928, but from description in inventory almost a duplicate of no. 511.

## CLASS IX. FLASKS

## A. Tall-necked flasks with constriction at base of neck

## I. Plain base

(a) Folded rim, inward

3. Shoulder collar, type as no. 533

43805. Green, fabric 4.

45778. Green, fabric 4.

5. Coil at rim, type as nos. 537-41

39621. Greenish colourless, fabric 3. H. 0.22 m.

(c) Folded rim, outward, downward, and upward

3. Horizontal wheel cuts or incisions, type as nos. 571-8

J 46476. Greenish colourless, fabric 2 or 3. H. 0.113 m. On body five sets of two horizontal wheel cuts with one single horizontal wheel cut below them.

Similar, but with more elaborate decoration

J 41061. Fig. 3, 1.

Yellowish colourless; intact; dirty, no weathering; bubbly.

H. 0.225 m. G.D. 0.125 m. A.T. on neck 0.003 m.

Shape as J 46476. Scratched decoration on body: at top, a frieze of double concentric circles; in centre, a curved zigzag line with 'facets' in angles and short horizontal strips outside angles, above and below; near base, a frieze of vertical lines; dividing these three groups are single horizontal lines.

Fabric 3.

## B. Tall-necked flasks with no constriction at base of neck

## I. Plain base

## (a) Folded rim, inward

1. Plain, type as nos. 594-607

J 45771. Green, fabric 5. H. 0.15 m.

3. Corrugations on body, and coils, type as no. 612

J 41069. Dark green, fabric 5.

## 5. Coils

Two complete examples, general type as for the fragments nos. 614 ff.

J 48218. Fig. 4, a.

Dull green; intact; no weathering; very bubbly.

H. 0.185 m. G.D. 0.114 m. A.T. 0.001 m.

Rim funnel-shaped and folded inward and downward. Neck cylindrical, meeting body in gentle curve. Body almost triangular with convex sides. Base concave with kick; pontil technique. On neck, two horizontal coils, the upper one triple, the lower one single.

Fabric 5.

46475. Greenish colourless, fabric 3. As no. 612 exactly, but for absence of corrugations.

## (b) Rounded rim

A variant type with large funnel rim, narrow neck, and bulbous body

J 40444. Fig. 4, b.

Yellow; intact; no weathering; bubbly, with impurities.

H. 0.115 m. G.D. 0.07 m. A.T. 0.0007 m.

Funnel rim, very large and convex-sided, and rounded at edge. Narrow, shortish neck, cylindrical. Body globular. Base concave with deep kick; no pontil technique.

Fabric 4.

45772. Not traceable in 1928, but from description in inventory apparently a duplicate of J 40444.

## CLASS X. BOTTLE-FLASKS WITHOUT HANDLES

## B. Tall neck and cylindrical or tapering body

## I. Rounded or pointed base

## 1. Plain, type as nos. 688-91

J 45766. Fig. 4, d. Yellowish colourless, fabric 3. H. 0.345 m. A cylindrical container of plaited palm-twigs is preserved with this piece.

46477. Yellowish green, fabric 3. H. 0.26 m.

The following bottle-flask does not fit into any of the subdivisions in the Catalogue:

J 45767. Fig. 4, e.

Greenish colourless; intact; no weathering; bubbly.

H. 0.265 m. G.D. 0.07 m. A.T. 0.0015 m. (?)

Rim slightly outsplayed, with unworked edge. Tall neck, deeply concave in centre and spreading out towards rim and body carination. Carinated 'biconical' body merging gradually above into neck and narrowing below to junction with stem. Outsplayed stem formed by pushed-in technique, the under fold reaching up to base of body of flask. On the interior of the body and on the under side of the

stemmed base is a decoration of white paint and gold foil, held in place by a coating of bitumen, the general effect being of a mottling of black, green, white, and gold.

Fabric doubtful but probably Roman, since it came to the Museum with a group of Roman vases (J 45765-78) found by *sebbakhîn* (see p. 223).

#### CLASS XI. ONE-HANDED JUGS AND BOTTLES

##### A. Jugs with ovoid or bulbous bodies

###### II. Cylindrical neck without constriction at base

###### (a) Circular mouth

###### 1. Folded rim

(α) Pad base, type in general as for the fragments nos. 712-18

J 46479.

Brown; intact; no weathering; bubbly.

H. 0.175 m. G.D. 0.083 m. A.T. 0.0025 m.

Rim outsplayed at angle of 45° and folded upward and inward. Tall neck widening slightly downward. Body ovoid with sharply curved shoulder. Sides almost straight and tapering inward to base. Pad base with kick; pontil technique. Faint criss-cross slanting impressions on exterior of ring. Quadruple coil below rim, single coil near base of neck, and five-ribbed handle, all of similar glass.

Fabric 5.

J 46480.

Wine-coloured; intact; no weathering; bubbly.

H. 0.185 m. G.D. 0.087 m. A.T. neck 0.003 m.

Rim outsplayed horizontally and folded upward and inward. Neck cylindrical. Body ovoid with gently curved shoulder; greatest diameter near top. Pad base with kick; pontil technique. Well-marked slanting impressions on exterior of ring. Flat handle of similar glass starting in coil round neck, bent upward to rim and downward thence to shoulder.

Fabric 6.

##### B. Cylindrical bottle-jugs

###### 3. Rounded rim

(α) Plain or with added coils only, in general as for fragments nos. 736-8

J 46478.

Pale yellow, green handle and coils; intact; no weathering; bubbly.

H. 0.218 m. G.D. 0.093 m. A.T. neck 0.002 m.

Rim outsplayed almost horizontally and rounded at edge. Neck widens slightly downward. Shoulder horizontal. Body cylindrical. Roll at junction of shoulder with body. Concave base with kick; pontil technique. Triple coil beneath rim, and five-ribbed handle, both of green glass.

Fabric 4.

##### C. Rectangular bottles

Folded rim, inward, pressed flat on top

(β) Plain-blown with flattened sides and base, type as nos. 757-60

J 45777. Olive green, fabric 9. H. 0.235 m. Sides of body 0.085 m. and 0.07 m. Body rectangular and not square in horizontal section.

## CLASS XII. TWO-HANDED FLASKS AND BOTTLES

## B. Tall-necked flasks with two coil handles at base of neck

## I. With constriction at base of neck, type as nos. 783-6

J 45769. Not traceable in 1928, but from the description in the inventory it probably belongs to B i.

46481. Fig. 4, f. Wine-coloured with green coils, fabric 6. H. as extant 0.115 m.

This piece was originally a tall-necked amphora of B i type, but the neck has been broken and repaired by placing a rim coil round the broken edge. There is a tell-tale crack in the neck just below the present rim coil and running underneath it, which could not have occurred after the coil was added.

## C. Miscellaneous types

Type with cylindrical body and concave base, shape as for fragment no. 791

J 45765.

Greenish colourless; intact; dirty, no weathering; very bubbly.

H. 0.29 m. G.D. 0.091 m. A.T. neck 0.004 m. (on body, far less).

Rim outsplayed at angle of 45° and rounded at edge, with cut-out roll just below.

Neck widens slightly downward. Body cylindrical. Slight roll at junction of shoulder and body. Concave base; no pontil technique. On body, wheel incisions: two groups near shoulder, six groups (in pairs) in centre, and two groups near base. Flat handles of similar glass from top of neck to rim and thence to shoulder.

Fabric 3.

Type with ovoid or bulbous body and pad base, in general as for fragmentary example no. 794

J 46482. Fig. 4, j.

Yellow; intact; no weathering; bubbly, with impurities.

H. 0.24 m. Maj. Ax. body 0.105 m. Min. Ax. body 0.067 m. A.T. 0.002 m.

Rim vertical and rounded. Tall neck, tapering downward. Bulbous, almost globular body, flattened by pressure on two sides to elliptical horizontal section. Pad base with kick; pontil technique. Well-marked slanting impressions on exterior of ring. At base of neck a double coil, and two small, coiled ring handles, all of similar glass. Unstable.

Fabric 4.

J 46484. Fig. 4, h.

Yellow; intact; no weathering; bubbly.

H. 0.15 m. G.D. 0.09 m. A.T. 0.0015 m.

Shape as J 46482, but body globular. Near rim a horizontal coil, near base of neck another, and two flat handles starting on shoulder and bent in to centre of neck, with tails extending to rim, all of similar glass.

Fabric 4.

Same type but on stemmed base

J 45768. Fig. 4, k.

Yellow; intact; dirty, no weathering; bubbly.

H. 0.18 m. G.D. 0.057 m. A.T. neck 0.002 m.

Rim vertical and rounded. Tall neck tapering downward. Ovoid body with sharply curved shoulder and almost straight sides tapering to stem. Twisted

stem with outsplayed foot, slightly concave below; pontil technique. Slanting impressions on exterior of foot. Spiral coil of similar glass in many revolutions from near base of neck to rim. Two threads of yellowish green glass starting in knob at stem and extending to rim, and forming rectangular handles from shoulder to centre of neck. The lower part of these threads (up to shoulder) is scalloped.

Fabric 4.

Type with pointed base, shape of body as for no. 793

J 45776. Fig. 4, g.

Yellow; intact; no weathering; bubbly, with impurities.

H. 0.14 m. G.D. 0.065 m. A.T. 0.001 m.

Rim outsplayed with unworked edge. Short constricted neck. Body ovoid with greatest diameter at shoulder; sides taper thence to near bottom, where they curve in more sharply to a butt end. Pontil technique. At neck, two small ring handles with short tails, of similar glass.

Fabric 4.

CLASSIFIED CATALOGUE OF GLASS FROM KARANIS (?), IN THE  
ASKREN COLLECTION

MUSEUM OF CLASSICAL ARCHAEOLOGY, UNIVERSITY  
OF MICHIGAN

CLASS I. DISHES AND PLATES

A. Oval dishes on base ring

I. Folded rim, outward

(a) Base ring with post technique

1. True base ring, type as nos. 1-14

Mich. 5005. Greenish colourless, fabric 3. H. 0.051 m. Maj. Ax. 0.243 m.

5006. Sea green, fabric 5. H. 0.06 m. Maj. Ax. 0.236 m.

5007. Sea green, fabric 5. H. 0.07 m. Maj. Ax. 0.271 m.

2. Pad base, type as nos. 15-16

Mich. 5004. Yellow, fabric 5 (?). H. 0.058 m. Maj. Ax. 0.24 m.

(b) Base ring with pontil technique, type as nos. 17-26

Mich. 5002. Yellow, fabric 4. H. 0.05 m. Maj. Ax. 0.217 m.

5003. Yellow, fabric 4. H. 0.05 m. Maj. Ax. 0.205 m.

B. Circular plates on base ring

A variant type with thickened rim

Mich. 5001.

Colourless with slight green tinge; intact; dirty stains, no weathering; some bubbles and bits of unfused sand; blowing spirals.

H. 0.02 m. D. 0.175 m. A.T. 0.001 m.

Rim thickened. Sides slope very slightly towards bottom. Base flat. Base ring vertical, and a true ring with post technique; no slanting impressions on exterior. Plate not perfectly circular.

Fabric 3.

## CLASS II. SHALLOW BOWLS

## A. With base ring

## I. Folded rim, outward

## (a) Base ring with post technique, type as nos. 83-8

Mich. 5009. Yellowish colourless, fabric 3. H. 0.042 m. D. 0.151 m.

## (b) Base ring with pontil technique

## 1. Almost rectangular contour, type as nos. 89-106

Mich. 5008. Yellowish colourless, fabric 3. H. 0.034 m. D. 0.156 m.

5011. Brownish yellow, fabric 4. H. 0.06 m. D. 0.147 m.

5012. Dark sea green, fabric 5. H. 0.055 m. D. 0.149 m.

5013. Dark olive green, fabric 5. H. 0.044 m. D. 0.145 m.

## 2. Wide obtuse-angled contour, type as no. 107

Mich. 5010. Greenish yellow, fabric 5. H. 0.053 m. D. 0.154 m.

5014. Brownish yellow, fabric 4 or 5. H. 0.058 m. D. 0.173 m.

## 3. Irregular crooked contour, type as nos. 108-16

Mich. 5015. Deep brownish yellow, fabric 4. H. 0.066 m. D. 0.162 m.

## CLASS III. DEEP BOWLS

## A. With base ring

## I. Folded rim, outward

## (a) Base ring with post technique, type as nos. 221-3

Mich. 5025. Light olive green, fabric 5. H. 0.072 m. D. 0.11 m.

## (b) Base ring with pontil technique

## 1. Bell-shaped body, type as nos. 228-34

Mich. 5016. Deep brownish yellow, fabric 4. H. 0.065 m. D. 0.132 m.

5017. Yellowish, fabric 4. H. 0.057 m. D. 0.109 m.

5018. Brownish yellow, fabric 4. H. 0.065 m. D. 0.126 m.

5019. Dark olive green, fabric 4. H. 0.06 m. D. 0.108 m.

5021. Yellowish, fabric 4. H. 0.07 m. D. 0.132 m.

5022. Yellow, fabric 4. H. 0.075 m. D. 0.121 m.

## 2. Convex-sided body, type as nos. 235-6

Mich. 5020. Yellow, fabric 4. H. 0.083 m. D. 0.126 m.

## II. Folded rim, inward

## (a) Base ring with post technique, type as nos. 237-41

Mich. 5023. Dark green, fabric 5. H. 0.058 m. D. 0.098 m.

5024. Sea green, fabric 5. H. 0.069 m. D. 0.121 m.

## III. Rounded rim

## (a) Base ring with post technique, type as nos. 246-55

Mich. 5026. Deep olive green, fabric 5. H. 0.057 m. D. 0.125 m.

5027. Deep olive green, fabric 5. H. 0.059 m. D. 0.114 m.

## CLASS IV. BOWLS ON STEM

B. Deep bowl, type as nos. 246 ff., class III, but on stem  
Mich. 5028.

Brown, streaked with purple (greenish on edge of base); intact; no weathering; some bubbles and impurities; blowing spirals noticeable.

H. 0.043 m. D. 0.09 m. A.T. 0.002 m.

Rim bent out horizontally from sides and thickened at lip by folding. Sides taper downward and bend in sharply at bottom. Stem formed by twisting. Base out-splayed and slightly concave below; pontil technique; slanting impressions on exterior.

Fabric 5.

## CLASS V. BEAKERS AND GOBLETS

## A. Beakers

## I. Rounded rim

(b) Tubular base, type as no. 365

Mich. 5213. Colourless with greenish tinge, fabric 1. H. 0.08 m.

A new type with flat base

Mich. 5214.

Greenish colourless; intact; dulled near rim; bubbly, with many impurities.

H. 0.061 m. D. 0.054 m. A.T. 0.001 m.

Rim vertical and folded inward and downward. Sides taper toward base. Base flat; pontil technique (mark shows traces of iron).

Fabric 2 or 3.

## CLASS VI. LAMPS

## A. Solid-pointed base

## I. Unworked rim; no pontil technique

(a) No decoration, type as nos. 436-7

Mich. 5087. Green, fabric 5. H. 0.135 m.

(b) Wheel incisions, type as nos. 438-9

Mich. 5086. Greenish yellow, fabric 5. H. 0.126 m.

5092. Greenish colourless, fabric 3. H. 0.165 m. Traces of lines of red paint near rim.

5093. Greenish colourless, fabric 3. H. 0.174 m. Traces of red paint, as on 5092.

5094. Greenish colourless, fabric 3. H. 0.103 m.

II. Rounded rim; pontil technique. No decoration, type as nos. 449-54  
Mich. 5088. Yellowish green, fabric 4. H. 0.129 m.

5089. Yellowish green, fabric 4. H. 0.122 m.

5090. Dark green, fabric 4. H. 0.121 m.

5091. Yellowish green, fabric 4. H. 0.11 m.

## B. Hollow, flattened base

## I. Unworked rim; no pontil technique

(a) Wheel incisions, type as nos. 455-6

Mich. 5085. Greenish yellow, fabric 5. H. 0.17 m.

(b) Wheel incisions and blue blobs, type as nos. 457-63

Mich. 5082. Greenish yellow, fabric 5. H. 0.209 m. Eighteen blue blobs divided into two groups of nine by two larger blobs diametrically opposed; near rim two groups of wheel incisions; below the blobs two more groups; and four centimetres farther down, a fifth.

5083. Greenish yellow, fabric 5. H. 0.204 m. Frieze of blue blobs in  $\circ\circ\circ\circ$  formation repeated four times. Wheel incisions as for 5082.

5084. Greenish yellow, fabric 5. H. 0.135 m. Frieze of blue blobs in  $\circ\circ\circ\circ$  formation repeated four times. The frieze flanked above and below by one group of wheel incisions.

#### D. Base knob

No parallel in the Catalogue. Bowl-shaped, with thumb-indented sides

Mich. 5120. Fig. 3, g.

Greenish yellow, with blue blobs and knob; intact; no weathering, stained inside; bubbly.

H. 0.073 m. G.D. 0.089 m. A.T. 0.0012 m.

Unworked rim, outspayed from constriction at top of sides. Angular shoulder.

Sides slightly convex, and meeting at base in a point, upon which is a solid base knob of blue glass. On shoulder traces of wheel incisions. At greatest diameter a row of ten blue blobs divided into groups of five by two larger blobs diametrically opposed. In body, six large vertical thumb indents. On one of the ridges between the indents is a stray blob of blue glass, probably unintentional.

Fabric 5.

### CLASS VII. DRINKING CUPS AND GOBLETS ON STEM

#### A. Cups

II. 'Poppy-head' body, type as no. 488

Mich. 5119. Yellowish brown, fabric 4. H. 0.083 m. G.D. 0.066 m.

### CLASS VIII. JARS

#### A. Deeply concave neck with open-work zigzag coil, bulbous body

II. Pad base

1. Plain bulbous body, type as nos. 494-6

Mich. 5121. Olive green, fabric 4. H. 0.14 m.

5122. Greenish yellow, fabric 4 (?) H. 0.123 m. Rim rounded and not folded.

2. Thumb-indented body, type as nos. 497-8

Mich. 5123. Brownish yellow with sea green coil, fabric 4. H. 0.155 m.

5124. Greenish yellow with yellowish green coil, fabric 4. H. 0.112 m.

5125. Brownish yellow, fabric 4. H. 0.092 m.

### CLASS IX. FLASKS

#### A. Tall-necked flasks with constriction at base of neck

I. Plain base

(a) Folded rim, inward

1. Plain, type as nos. 516-30

Mich. 5141. Greenish yellow, fabric 5. H. 0.085 m.

5142. Colourless with greenish tinge, fabric 2. H. 0.074 m.

Mich. 5143. Brownish yellow, fabric 5. H. 0.07 m.  
 5144. Yellow, fabric 5. H. 0.091 m. Rim unfinished.  
 5238. Greenish colourless, fabric 8. H. 0.048 m.  
 5239. Colourless, fabric 2. H. 0.049 m.  
 5240. Greenish colourless, fabric 8. H. 0.036 m.  
 5241. Colourless, fabric 2. H. 0.045 m.  
 5243. Green, fabric 5 (?). H. 0.023 m.  
 5244. Colourless, fabric 2. H. 0.026 m.  
 5245. Marbled ware, brown, green, blue, &c. H. 0.027 m.  
 5247. Colourless, fabric 2. H. 0.041 m.

2. Thumb-indented or flat-sided bodies, type as nos. 531-2  
 Mich. 5231. Buff colourless, fabric 1. H. 0.056 m.

3. Shoulder collar, type as no. 533  
 Mich. 5127. Dark green, fabric 5. H. 0.232 m.  
 5128. Yellowish colourless, fabric 3. H. 0.233 m.  
 5129. Greenish colourless, fabric 3. H. 0.161 m.  
 5133. Yellow, fabric 4. H. 0.18 m. Pontil technique and kick.  
 5134. Yellow, fabric 4. H. as extant (neck missing) 0.095 m. Pontil technique and kick.  
 5135. Yellow, fabric 4. H. as extant (neck missing) 0.095 m. Pontil technique and kick.

4. Shoulder collar and raised pinches on body, type as nos. 534-6  
 Mich. 5130. Yellowish green, fabric 5. H. as extant (rim missing) 0.22 m.  
 5131. Yellow, fabric 5. H. 0.22 m.

4 and 5 in combination. Shoulder collar, raised pinches on body, and coil at rim, compare nos. 534-7  
 Mich. 5132. Yellowish colourless, greenish collar and coil, fabric 3. H. 0.155 m.

(c) Folded rim, outward, downward, and upward  
 3. Horizontal wheel cuts or incisions, type as nos. 571-8  
 Mich. 5137. Colourless with greenish tinge, fabric 1. H. 0.095 m.  
 5138. Greenish colourless, fabric 1. H. 0.078 m.  
 5139. Colourless with greenish tinge, fabric 1. H. 0.097 m.  
 5140. As 5139 exactly.

(d) Rounded rim  
 Since all the examples of type A in the Catalogue that have corrugations on the body have also rounded rims, the following fragmentary specimen is listed here though its rim is lost. The combination of shoulder coil and corrugations is unknown on any flask in the Catalogue.  
 Mich. 5136.  
 Deep olive green; rim and upper part of neck missing; usage scratches, no weathering; pin-prick bubbles.  
 H. as extant 0.17 m. G.D. 0.147 m. A.T. 0.002 m.  
 Neck broken off near base, where is a deep constriction. Body piriform with concavity in sides near top and convexity toward base. Base concave; no pontil technique. At shoulder a horizontal coil of similar glass. On body a series of vertical corrugations.  
 Fabric 5.

## [(e) Unworked rim]

A variant type, with unworked rim like that of first-century flasks in Syria and the west. No examples with unworked rim occur in the Catalogue.

Mich. 5242.

Blue; rim chipped in two places; body cracked; contents stain, no weathering; bubbly and one brown flaw; blowing spirals.

H. 0.054 m. G.D. 0.026 m. A.T. 0.002 m.

Rim outsplayed and rounded. Neck cylindrical with constriction at base. Body oval. Base flat, no pontil technique.

Perhaps fabric 7, but a lighter blue than usual.

## II. Base ring

## (b) Pushed-in base

A variant type with more open base than any in the Catalogue, not pushed in far enough to form a real ring.

Mich. 5246.

Greenish; chipped on rim; spots of milky weathering; very bubbly; some sandy impurities and some stone.

H. 0.051 m. G.D. 0.026 m. A.T. 0.001 m.

Rim outsplayed at angle of 45° and folded upward and inward. Neck short and cylindrical with constriction at base. Body inverted-piriform with deep cut-in near bottom. Base flat with pontil technique.<sup>1</sup>

Fabric 8.

Mich. 5248.

Colourless; intact; milkiness on interior of neck; some pin-prick bubbles, few impurities.

H. 0.079 m. G.D. 0.024 m. A.T. 0.001 m.

Shape as for no. 5246 but base is pushed in to concavity.<sup>1</sup>

Fabric 2.

## B. Tall-necked flasks with no constriction at base of neck

## I. Plain base

## (a) Folded rim, inward

## 1. Plain, type as nos. 594-607

Mich. 5219. Colourless with greyish tinge, fabric 8. H. 0.071 m.

5220. Bluish green, fabric 8. H. as extant (rim missing) 0.05 m.

5221. Colourless with greenish tinge, fabric 2. H. 0.034 m.

5222. Colourless with greenish tinge, fabric 2. H. 0.037 m.

5223. Dark sea green, fabric 5 (?). H. 0.03 m.

5224. Colourless with greenish tinge, fabric 2. H. 0.033 m.

5225. Light bluish green, Syrian (?). H. 0.033 m.

5226. Light bluish green, Syrian (?). H. 0.047 m.

5227. Light bluish green, Syrian (?). H. 0.037 m.

5228. Light bluish green, Syrian (?). H. 0.028 m.

5229. Bluish green with dark blue thread (remains of handle ?) on shoulder, fabric 8. H. 0.071 m.

5237. Green, fabric 8. H. 0.045 m.

<sup>1</sup> It seems as if the blower had intended in both these examples to make a tubular base ring.

## 5. Coils

A variant type with squat bulbous body and two coils on neck. A similar flask is in Cairo, J 48218 (Fig. 4, a; see App., p. 315).

Mich. 5155.

Brownish yellow; intact; usage scratches, no weathering; bubbly, many impurities; blowing spirals.

H. 0.17 m. G.D. 0.114 m. A.T. 0.001 m.

Rim vertical and folded inward and downward in a solid fold. Neck tapers downward to rounded junction with shoulder. Shoulder sloping. Body squat bulbous with greatest diameter at base. Base deeply concave with pontil technique. Two horizontal coils of similar glass on neck, half-way and three-quarters of the way down, the first double, the second single.

Fabric 5.

## 7. Mould-blown decoration

Several variant types of moulded vases must be listed here, though it is probable that all of them are Syrian and not Egyptian.

Mich. 5299.

Creamy colourless; a few cracks and one hole; rust-coloured stain, no weathering; very bubbly, with black impurities.

H. 0.194 m. Maj. Ax. 0.13 m. Min. Ax. 0.091 m. A.T. 0.0003 m.

Rim outplayed and folded inward unevenly. Neck widens downward. Body bulbous; elliptical in horizontal section. Base flat; pontil technique. Neck plain-blown, body blown into bipartite mould with mould marks vertically at major axis and across base. Design, two monkeys squatting facing each other at ends of major axis, and seeming to support vase with arms and legs outstretched. Between monkeys, front and back, a T-shaped design of raised bosses. Paper-thin glass.

Syrian (?) fabric.

Mich. 5300. As 5299 exactly. H. 0.21 m.

5301. As 5299 exactly. H. 0.207 m.

5302-5. As 5299 exactly. H. 0.175 m.

Mich. 5306.

Dark brown; deformed; stained, no weathering; very bubbly, with black impurities.

H. 0.154 m. G.D. 0.086 m. A.T. 0.0005 m.

Rim vertical and folded inward and downward. Neck narrow and tapering downward. Body bulbous. Base flat with pontil technique. Neck plain-blown, body blown in bipartite mould but misshapen owing to bad junction between parts of mould. Mould marks on base and side. Design hard to decipher but perhaps two seated females.

Syrian (?) fabric.

Mich. 5307.

Blackish green; neck missing; stains inside and out, no weathering; very bubbly.

H. as extant 0.10 m. G.D. 0.09 m. A.T. varies 0.001-0.005 m.

Neck tapers downward. Body ovoid with greatest diameter near top; slightly elliptical in horizontal section. Base flat. Neck plain-blown, body blown into bipartite mould with mould marks showing vertically on sides. Design, two female busts. Very thick glass, especially at base.

Syrian (?) fabric.

Mich. 5308. Fragmentary mould-blown vase, brown glass. Two Bes (?) figures back to back. H. as extant 0.055 m. Syrian (?) fabric.

(b) Rounded rim

A variant type, perhaps not of Egyptian fabric.

Mich. 5149.

Olive green; intact; milky-pitting weathering and iridescence combined; very bubbly; blowing spirals noticeable.

H. 0.147 m. G.D. 0.115 m. A.T. 0.003 m.

Rim outsplayed and rounded. Tall neck widening slightly downward and not set quite perpendicularly on body. Body globular. Base concave with kick; pontil technique.

If Egyptian, fabric 5.

A type with no parallel in the Catalogue, standing on four pinched toes; compare C iv (b).

Mich. 5151.

Yellowish colourless; intact; incipient milky weathering; material good; few bubbles.

H. 0.091 m. G.D. 0.066 m. A.T. 0.003 m.

Rim vertical and rounded. Neck tapers slightly downward. Body squat spherical. Base slightly concave; pontil technique. Four pinched feet.

Fabric 4 or 5.

(c) Unworked rim

A type of flask with no parallel in the Catalogue, akin in fabric and technique of decoration to the lamps with blue blobs of class VI, and to the parallel round-bottomed bowls of class III. No other example of this fabric and technique is known at Karanis outside those two classes.

Mich. 5152.

Greenish yellow; chip out of rim; stained; bubbly.

H. 0.148 m. G.D. 0.087 m. A.T. 0.002 m.

Rim slightly outsplayed and unworked. Neck tapers downward. Body squat-ovoid, greatest diameter at shoulder. Base concave; no pontil technique. Two double rows of horizontal wheel incisions on body, between which a band of sixteen blue blobs.

Fabric 5.

#### CLASS X. BOTTLE-FLASKS WITHOUT HANDLES

##### B. Tall neck and cylindrical or tapering body

###### I. Rounded or pointed base

###### 1. Plain

Two variant types.

Mich. 5279.

Bluish green; lip missing; iridescent; very bubbly; some brown impurities.

H. as extant 0.061 m. G.D. 0.029 m. A.T. 0.0012 m.

Rim outsplayed, lip missing. Neck cylindrical. Elongated ovoid body with greatest diameter at shoulder. Pointed base; pontil technique showing metal mark.

Fabric 8 (?).

## Mich. 5280.

Light green; part of base missing; mottled enamel-like weathering, brown in colour, flaking off and leaving pits; bubbly.

H. as extant 0.12 m. G.D. 0.041 m. A.T. 0.003 m.

Rim vertical and rounded. Neck cylindrical with slightly concave sides. Body inverted-conical to near bottom, where it becomes pyramidal. Base pointed.

Late Roman, fabric 5 (?).

2. With thumb indents or vertical corrugations or ribs

Two variant types.

## Mich. 5274.

Green; neck missing; light brown enamel-like weathering, flaking off in part and leaving pitted surface.

H. as extant 0.081 m. G.D. 0.031 m. A.T. 0.002 m.

Neck and rim missing. Body elongated-ovoid, tapering slightly downward. Base flat; pontil technique. Twelve vertical indents in body, uneven, made with pucellas.

Roman (?).

## Mich. 5281.

Green; neck missing; pitted, iridescent and frosted.

H. as extant 0.07 m. G.D. 0.027 m. A.T. 0.002 m. (?).

Neck and rim missing. Body elongated leaf-shaped, with pointed base; greatest diameter near shoulder. Seven pinched-out vertical ribs on body at greatest diameter.

Roman (?).

II. Flat or concave base

1. Plain

Two variant types.

## Mich. 5272.

Colourless with greenish tinge; one radiate crack; incipient milky weathering; some pin-prick bubbles.

H. 0.068 m. G.D. 0.027 m. A.T. 0.0015 m.

Rim vertical and folded outward and downward. Neck short and tapering downward. Shoulder well marked and sloping inward to junction with neck. Body tapers slightly downward. Base concave; pontil technique.

Fabric 1 or 2.

Mich. 5273. As 5272, but neck missing. H. to base of neck 0.065 m.

CLASS XI. ONE-HANDED JUGS AND BOTTLES

A. Jugs

II. Cylindrical neck with no constriction at base

(a) Circular mouth

1. Folded rim

(α) Pad base, type as nos. 712-18

Mich. 5157. Yellow, fabric 4. H. 0.206 m. Body ovoid, no coils on neck or rim.

## (β) Concave base

No parallel in the Catalogue.

Mich. 5158.

Light sea green; intact; no weathering; very bubbly; black and brown impurities.  
H. 0.074 m. G.D. 0.04 m. A.T. 0.0013 m.

Rim outsplayed and folded upward and inward. Neck tall and concave. Shoulder very sloping. Body inverted-piriform with convex sides. Base concave with kick; pontil technique. Horizontal coil on shoulder, and handle joining the coil with the rim, both of similar glass.

Fabric 5 (?).

## (c) Spouted mouth

1. Folded rim, inward

A variant type.

Mich. 5218.

Colourless with greenish tinge; intact; stains inside, no weathering; few bubbles; some brown impurities in handle.

H. 0.061 m. G.D. 0.03 m. A.T. 0.001 m.

Vertical spout pinched upward from rim. Rim slightly outsplayed and folded inward and downward. Neck concave. Shoulder very sloping. Body inverted-piriform with convex sides. Base flattened; pontil technique. Handle from underneath rim to shoulder.

Fabric 2.

## C. Rectangular bottles

3. Rounded rim, type as for fragment no. 764

Mich. 5156.

Light olive green; intact; usage scratches, milky weathering on neck; bubbly; some impurities.

H. 0.103 m. W. of side 0.06 m. A.T. 0.0015 m.

Rim outsplayed and rounded, with strengthening coil on under side. Neck cylindrical. Body nearly cubical; flattened on four sides by pressure after blowing. Base slightly concave; no pontil technique.

Fabric 5.

## CLASS XII. TWO-HANDED FLASKS AND BOTTLES

## B. Tall-necked flasks with two coil handles at base of neck

I. Constriction at base of neck, type as nos. 783-6

Mich. 5162. Dark green, fabric 4. H. 0.151 m.

5163. Yellow, fabric 4. H. 0.15 m.

## C. Miscellaneous types

Type as no. 789

Mich. 5161. Yellowish tinged with purple, green handles, fabric 3. H. 0.112 m.  
Nine vertical pinches in body; coil beneath rim; flat handles.

Olla of millefiori ware. No parallel in the Catalogue.

Mich. 5298.

Millefiori moulded ware on green core; cracked in antiquity by heat in fire (or during annealing ?); dulled, no weathering.

H. 0.305 m. G.D. 0.163 m. Thick glass.

Olla-shape. Rim rounded. Neck doubly concave with angle between the curves.

Shoulder rounded. Sides taper to base. Base concave; pontil technique. Two handles of blue and opaque white glass on shoulder. Mosaic pattern cut from two cylinders: (a) starry pattern with red centre, (b) starry pattern with yellow centre. Cuttings from these two cylinders were placed in mould and fused together to form outer skin, and afterwards a core of green glass was blown inside this moulded pattern. The whole was then formed into its present shape by secondary blowing.

Early Roman millefiori ware.

### CLASS XIII. TOILET-BOTTLES

#### A. Triangular body, about one-third total height

##### I. Hollow body, type as nos. 797-802

Mich. 5166. Sea green, fabric 9. H. 0.21 m.

5167. Light sea green, fabric 9. H. 0.203 m.

5168. Sea green, fabric 9. H. 0.196 m.

5169. Dark sea green, fabric 9. H. 0.18 m.

5170. Light sea green, fabric 9. H. 0.155 m.

5171. Sea green, fabric 9. H. 0.15 m.

5172. Light sea green, fabric 9. H. 0.11 m.

#### B. Triangular body about one-half total height, type as nos. 805-18

Mich. 5173. Dark green, fabric 9. H. 0.165 m.

5174. Olive green and opaque white marbled glass. H. 0.106 m.

5175. Opaque green, fabric 9. H. 0.115 m.

#### C. Squat type, triangular body, diameter of base more than one-half total height, type as nos. 815-18

Mich. 5176. Dark green, fabric 9. H. 0.087 m.

5177. Dark green, fabric 9. H. 0.071 m.

5178. Dark green, fabric 9. H. 0.07 m.

5179. Dark green, fabric 9. H. 0.063 m.

5180. Dark green, fabric 9. H. 0.062 m.

5181. Dark green, fabric 9. H. 0.057 m.

5182. Light olive green, fabric 9. H. 0.041 m.

#### D. Tall neck, squat rounded body, hollow or solid, type as nos. 819-22

Mich. 5183. Light green, fabric 9. H. 0.159 m.

5184. Sea green, fabric 9. H. 0.101 m.

5185. Sea green, fabric 9. H. 0.101 m.

5186. Yellowish green, fabric 9. H. 0.091 m.

#### E. No distinction between neck and body

##### I. Solid base, type as nos. 823-32

Mich. 5187. Light green, fabric 9. H. 0.106 m.

5188. Light green, fabric 9. H. 0.103 m.

5189. Light green, fabric 9. H. 0.095 m.

5190. Dark green, fabric 9. H. 0.074 m.

5191. Dark green, fabric 9. H. 0.09 m.  
 5192. Olive green to bluish green, fabric 9. H. 0.091 m.  
 5193. Light green to dark brown, fabric 9. H. 0.091 m.  
 5194. Green and brown streaky, fabric 9. H. 0.10 m.  
 5195. Emerald green, fabric 9. H. 0.098 m.  
 5196. Dark green, fabric 9. H. 0.087 m.  
 5197. Dark green, fabric 9. H. 0.076 m.  
 5198. Dark green, fabric 9. H. 0.09 m.  
 5199. Green, fabric 9. H. 0.097 m.

II. Hollow base and thin walls, type as no. 833

Mich. 5250. Dull green, fabric 9. H. 0.058 m.  
 5251. Olive green, fabric 5 (?). H. 0.049 m.

F. Tall, narrow vases with modelling mark about one-third of way up, dividing neck from body, type as nos. 834-5

Mich. 5200. Dark green, fabric 9. H. 0.181 m.  
 5201. Dark green, fabric 9. H. 0.135 m.  
 5202. Dark green, fabric 9. H. 0.134 m.  
 5203. Dark green, fabric 9. H. 0.126 m.  
 5204. Dark green, fabric 9. H. 0.114 m.  
 5205. Dark green, fabric 9. H. 0.142 m.  
 5206. Dark green, fabric 9. H. 0.163 m.  
 5252. Green, fabric 9. H. 0.095 m.  
 5253. Dark green, fabric 9. H. 0.094 m.  
 5254. Dark green, fabric 9. H. 0.062 m.  
 5255. Dark green, fabric 9. H. body 0.029 m.  
 5256. Brownish black, fabric 9. H. body 0.041 m.  
 5257. Colourless, fabric 9 (?). H. 0.085 m.

G. Small drop-shaped vases, type as nos. 836-7

Mich. 5258. Colourless, fabric 2 (?). H. 0.04 m.  
 5259. Light blue, early ware (?). H. 0.039 m.

H. Thin-walled vases with broad flat bodies, type as nos. 838-43

Mich. 5249. Green, fabric 8. H. 0.07 m.



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39	277	505	695	895
46	286	515	707	900
55	291	517	716	905
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70	314	546	730 (2 exx.)	913
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<sup>1</sup> For a list of the more important museums, with full titles, see pp. xiii–xiv.

<sup>2</sup> The Niessen Collection has recently been sold; the European portion is now in Cologne Museum; the remainder (including the Syrian) has been dispersed. I owe this information to the kindness of Dr. Fremersdorf.

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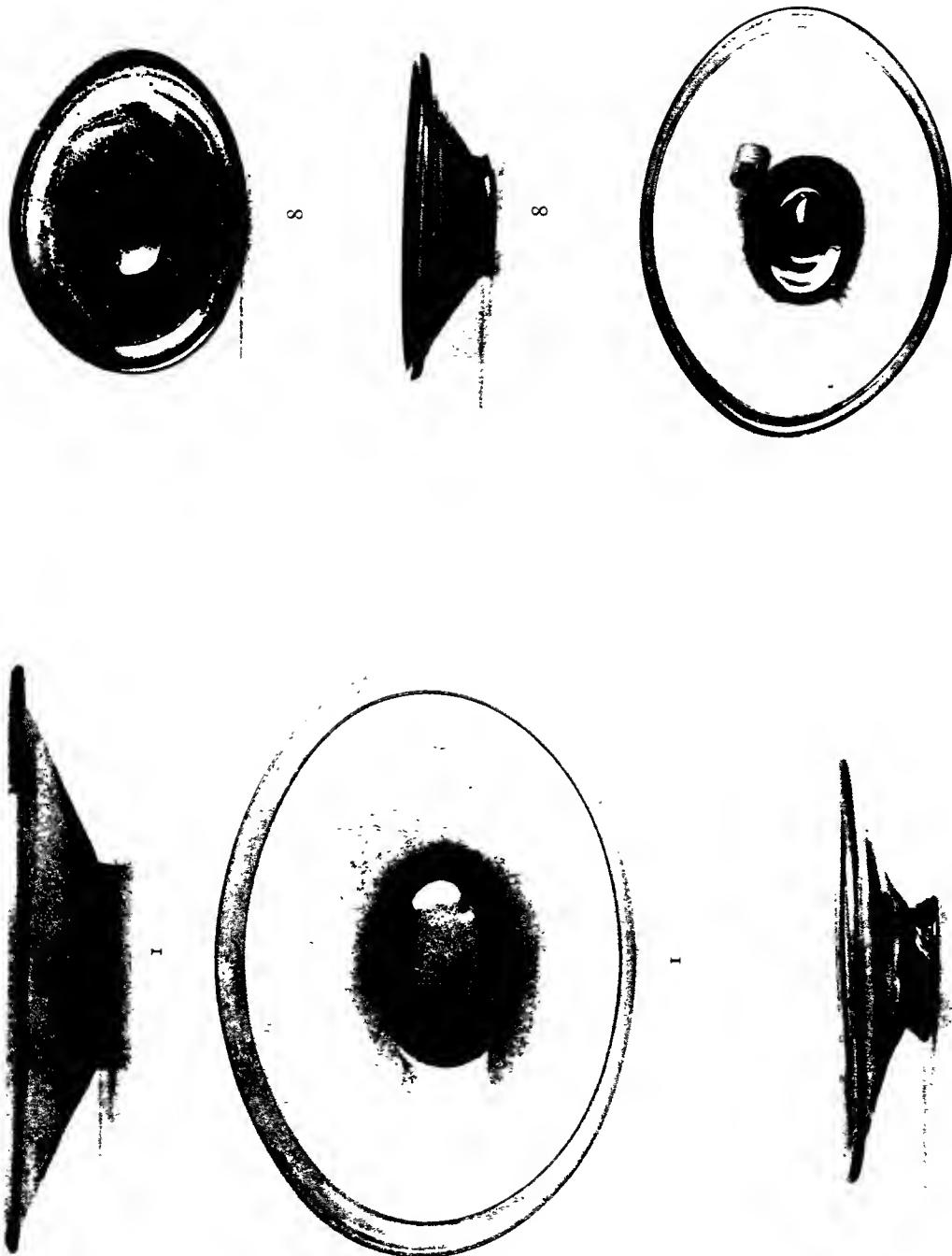
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## PLATES AND FIGURES





CLASS I. OVAL DISHES  
See pp. 52-4. Scale  $\frac{1}{3}$





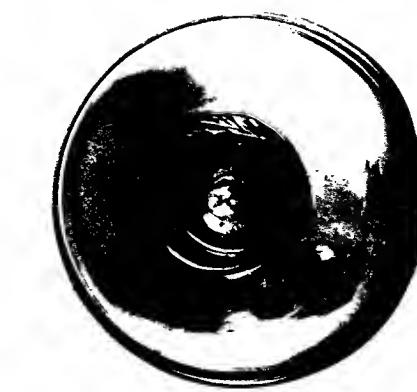
83



83



130



90



169



108

## CLASS II. SHALLOW BOWLS

See pp. 70-84. Scale 1





228



247



235



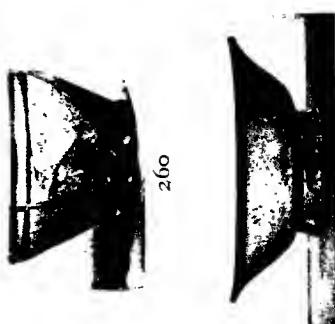
237



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CLASS III. DEEP BOWLS  
See pp. 106-22. Scale  $\frac{1}{4}$





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358



359



391



365



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CLASSES IV-V. BOWLS ON STEM, BEAKERS, AND GOBLETS

See pp. 130-49. Scale  $\frac{1}{3}$





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464



436



455



449



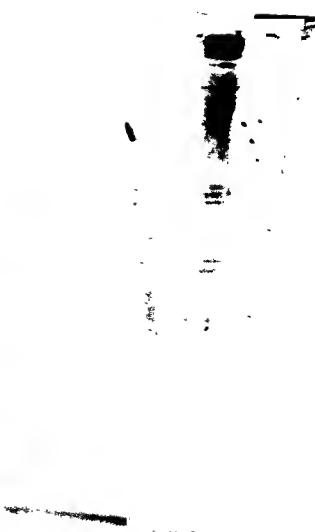
440



460



438



457

## CLASS VI. CONICAL LAMPS

See pp. 159-64. Scale  $\frac{1}{3}$





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509



494



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493

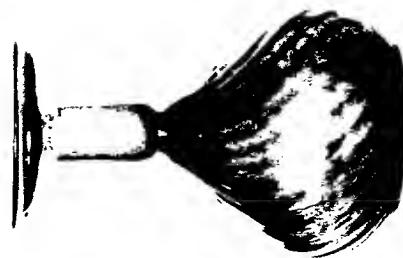
## CLASSES VII-VIII. DRINKING CUPS AND JARS

See pp. 171-84. Scale  $\frac{1}{2}$





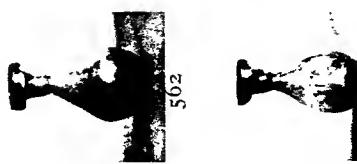
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568



588



516



533



521



CLASS IX. FLASKS  
See pp. 195-207. Scale  $\frac{1}{2}$





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600



596



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594



608



628



601

CLASS IX. FLASKS (*continued*)  
See pp. 208-13. Scale  $\frac{1}{2}$





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686



709



688



692



696



757



739



720



732

CLASSES X-XI. BOTTLE-FLASKS, JUGS, AND BOTTLES  
See pp. 226-49. Scale  $\frac{1}{3}$





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793



788



789



792



815



834



823



797



833



827



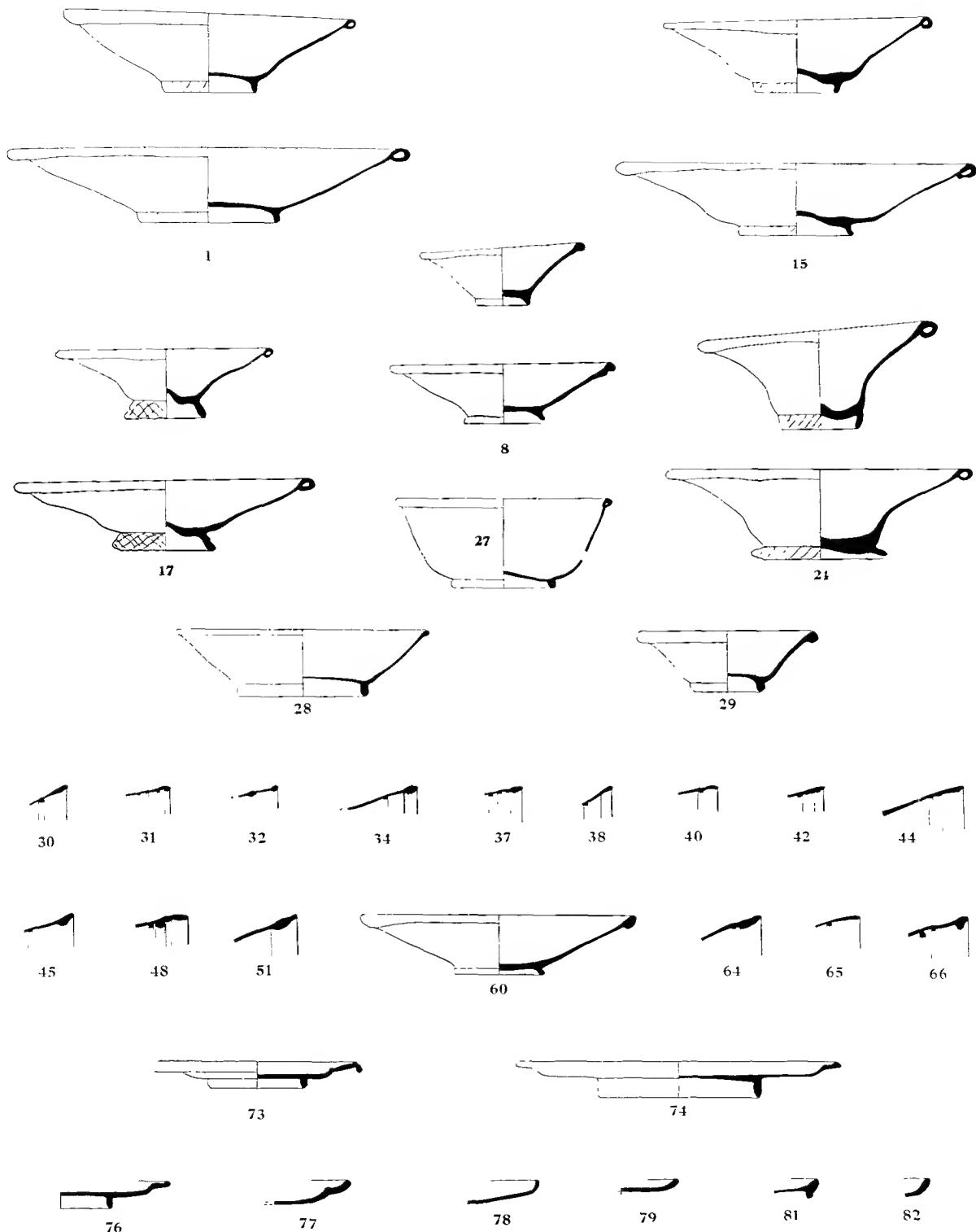
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CLASSES XII-XIII. TWO-HANDED FLASKS AND TOILET-BOTTLES  
See pp. 262-77. Scale  $\frac{1}{3}$

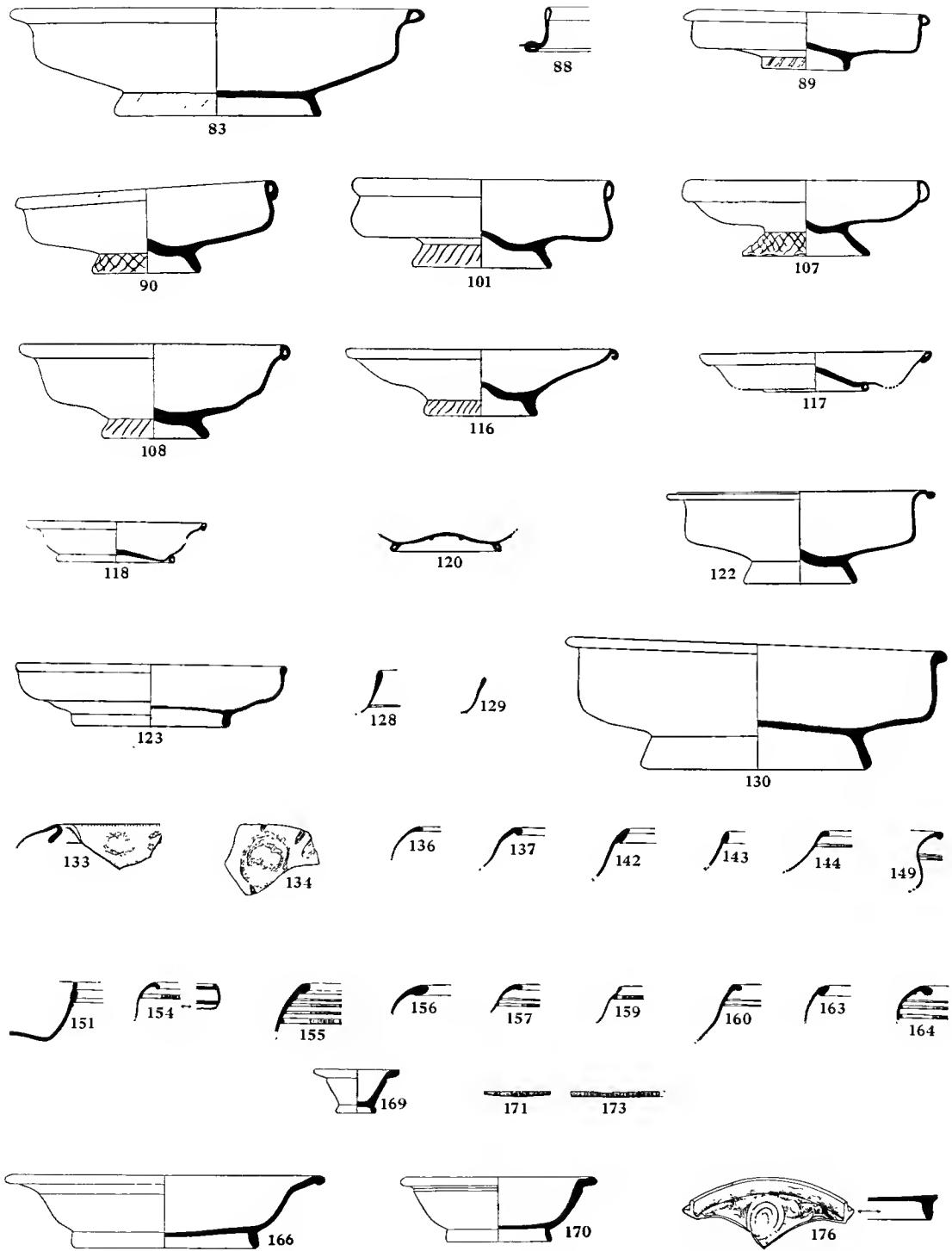




## CLASS I. DISHES AND PLATES

See pp. 52-82. Scale  $\frac{1}{4}$

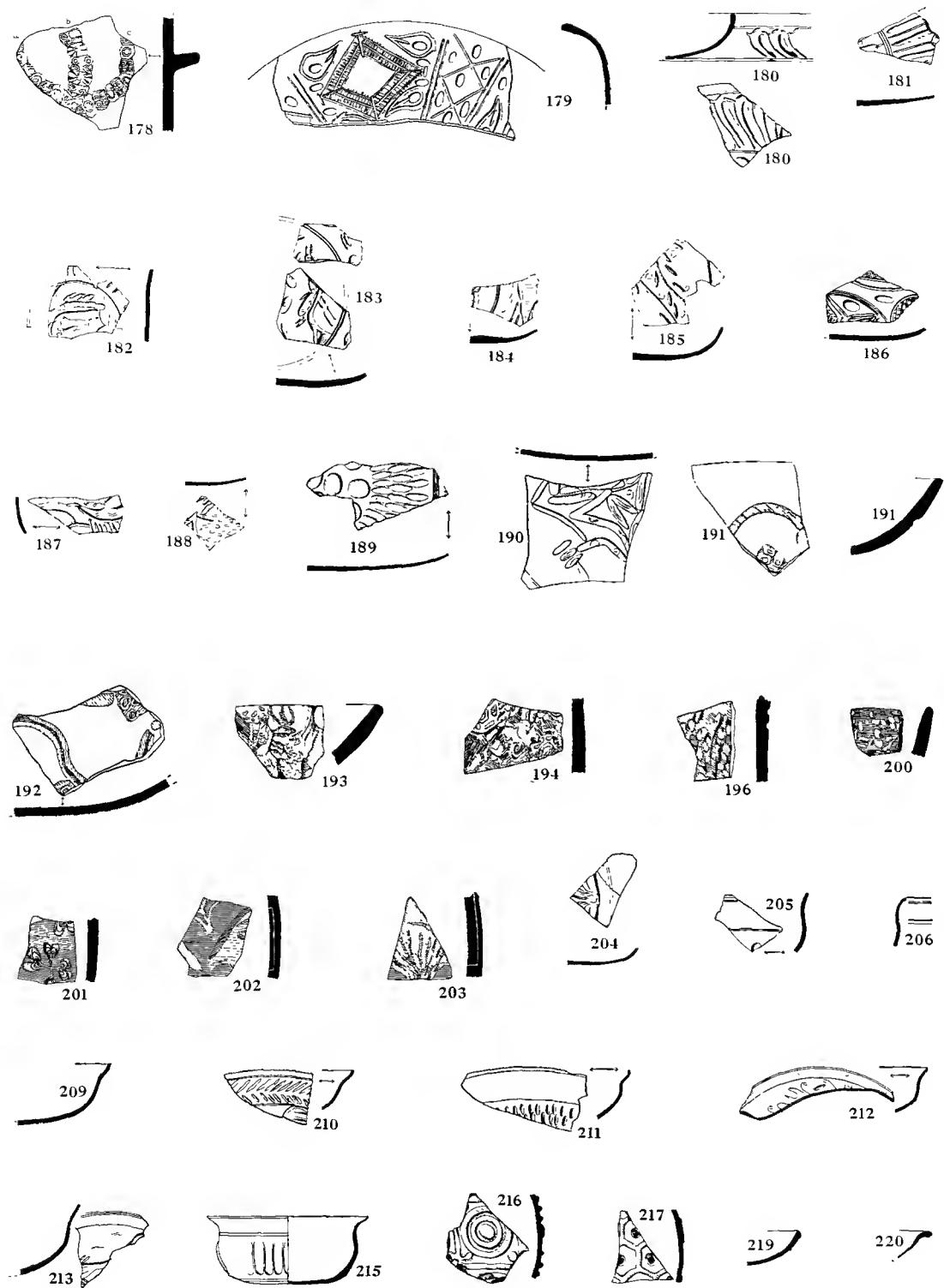




## CLASS II. SHALLOW BOWLS

See pp. 70-85. Scale  $\frac{1}{4}$





Yellow White Black Brown Blue Red Green Purple

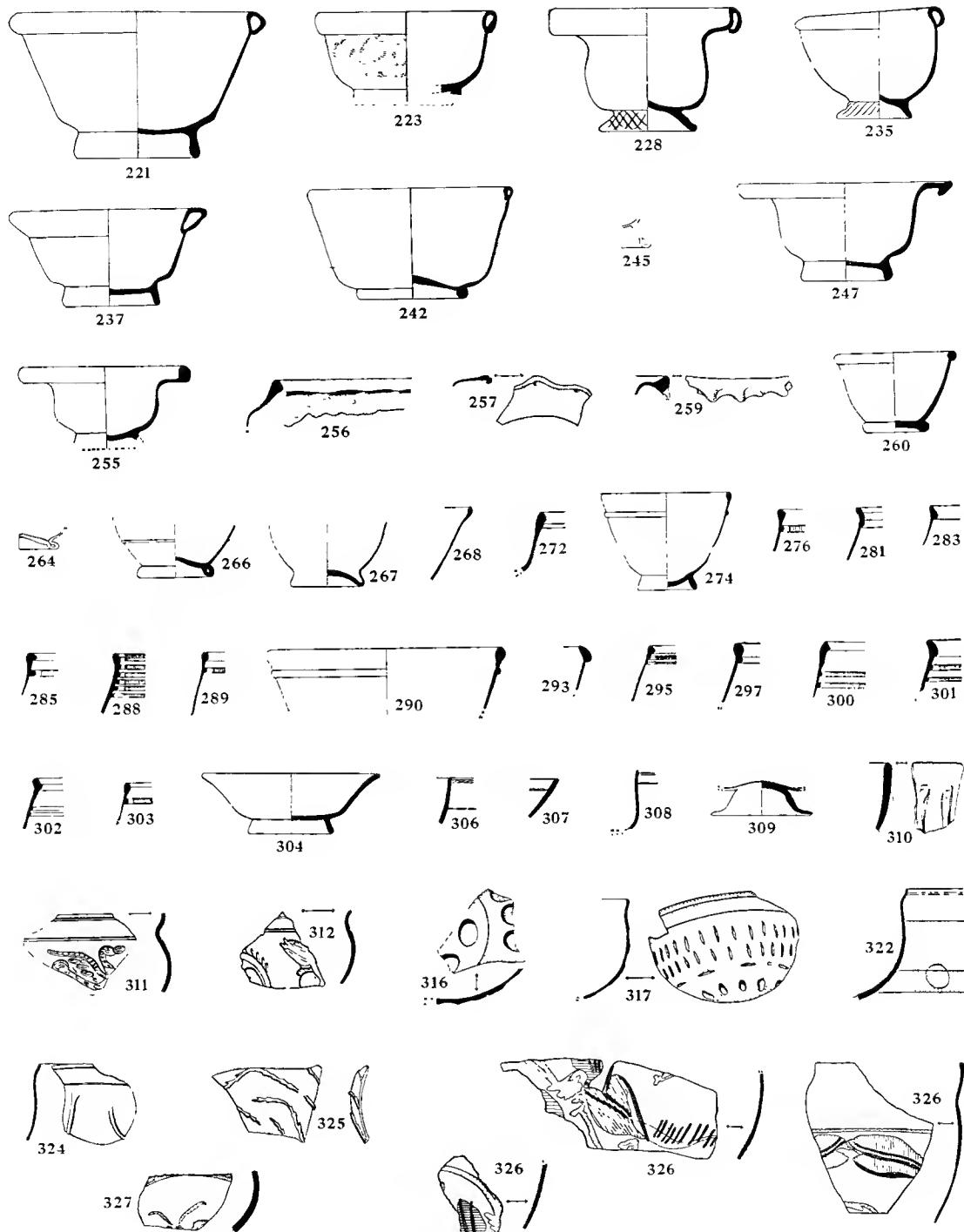
CLASS II. SHALLOW BOWLS (*continued*)

See pp. 85-94

Nos. 178, 191-203: Scale  $\frac{1}{2}$

Nos. 179-90, 204-20: Scale  $\frac{1}{4}$



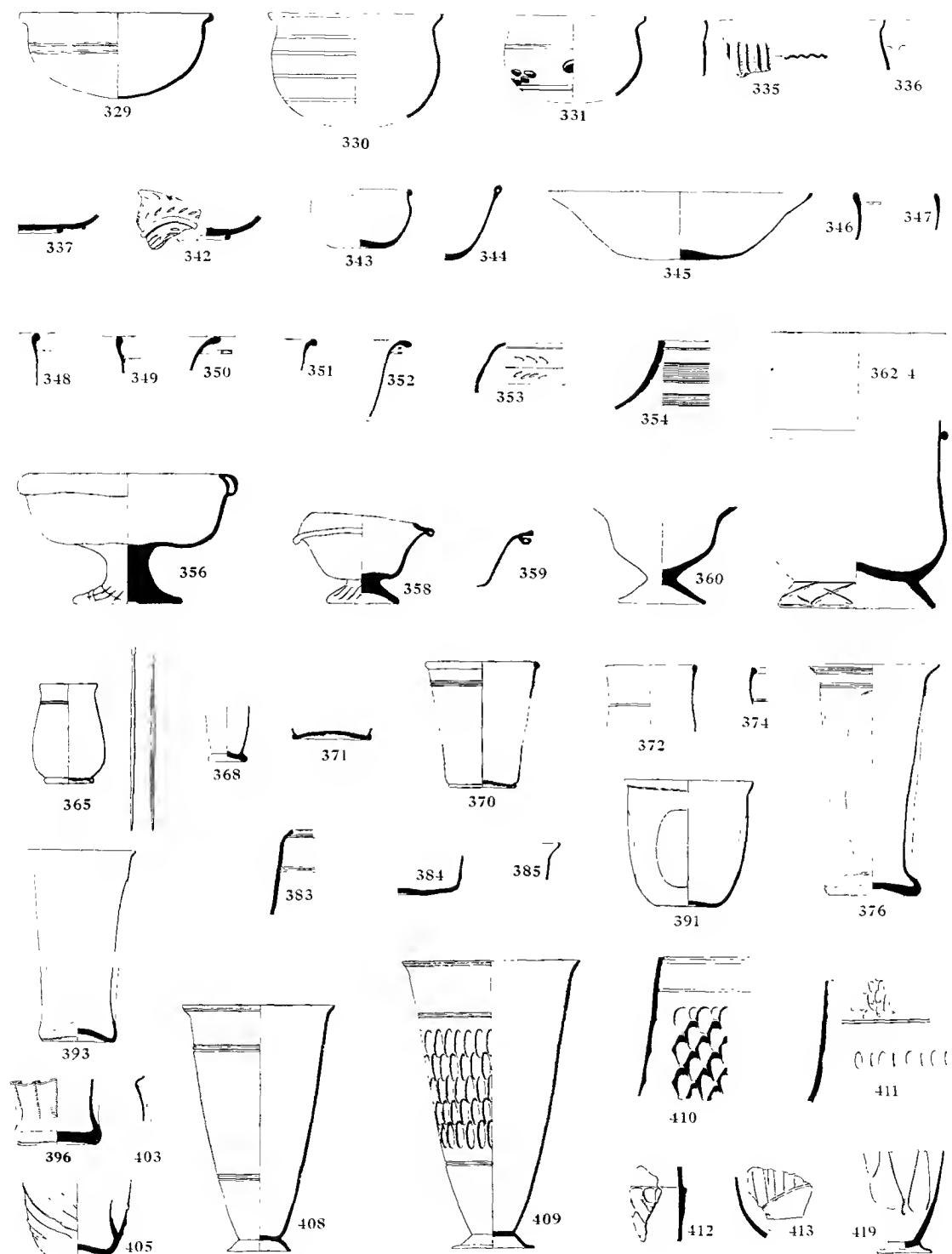


## CLASS III. DEEP BOWLS

See pp. 105-22

Nos. 326-7: Scale  $\frac{1}{2}$ Remainder: Scale  $\frac{1}{4}$

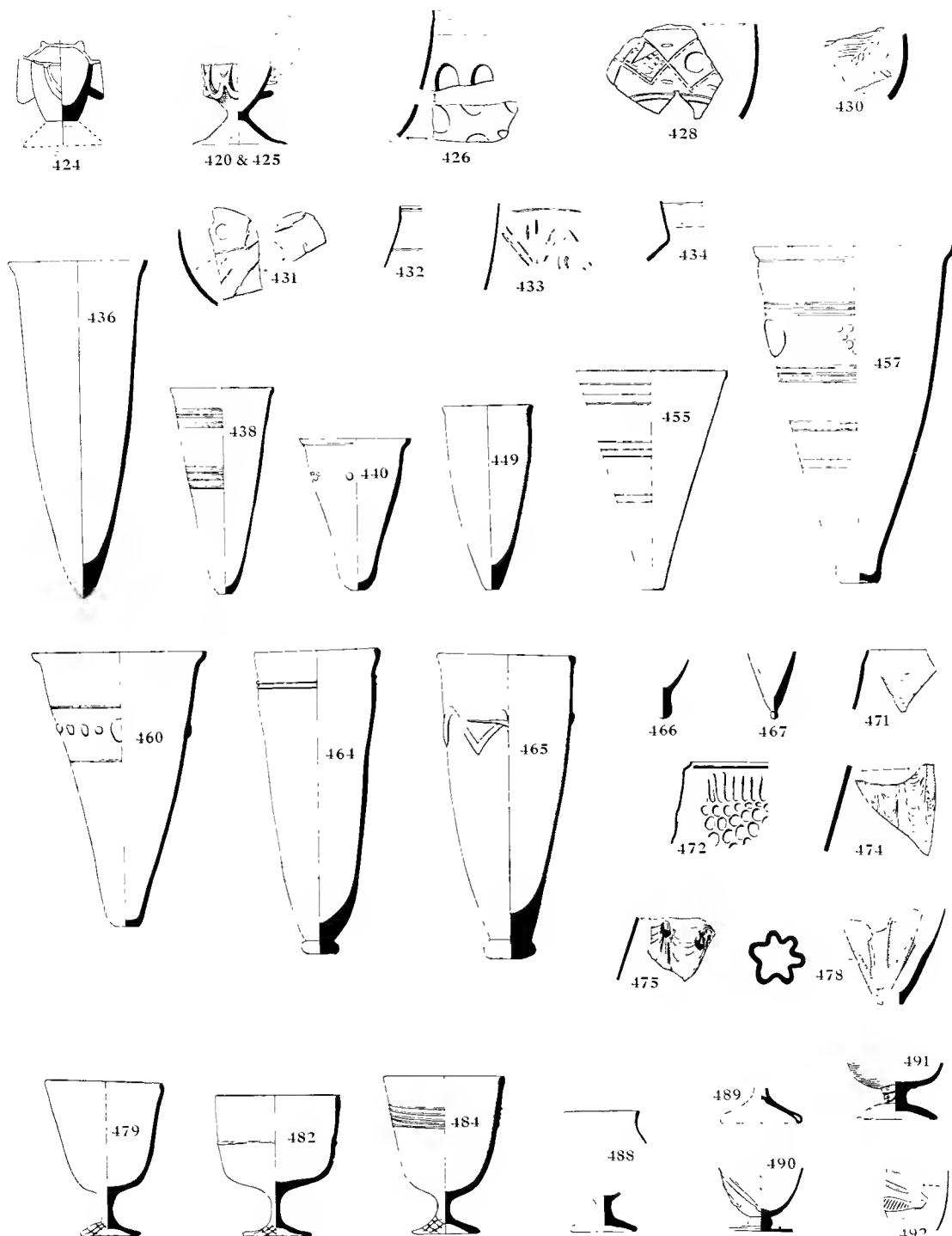




CLASSES III-V. DEEP BOWLS, BOWLS ON STEM, BEAKERS, AND GOBLETS

See pp. 122-51. Scale 1

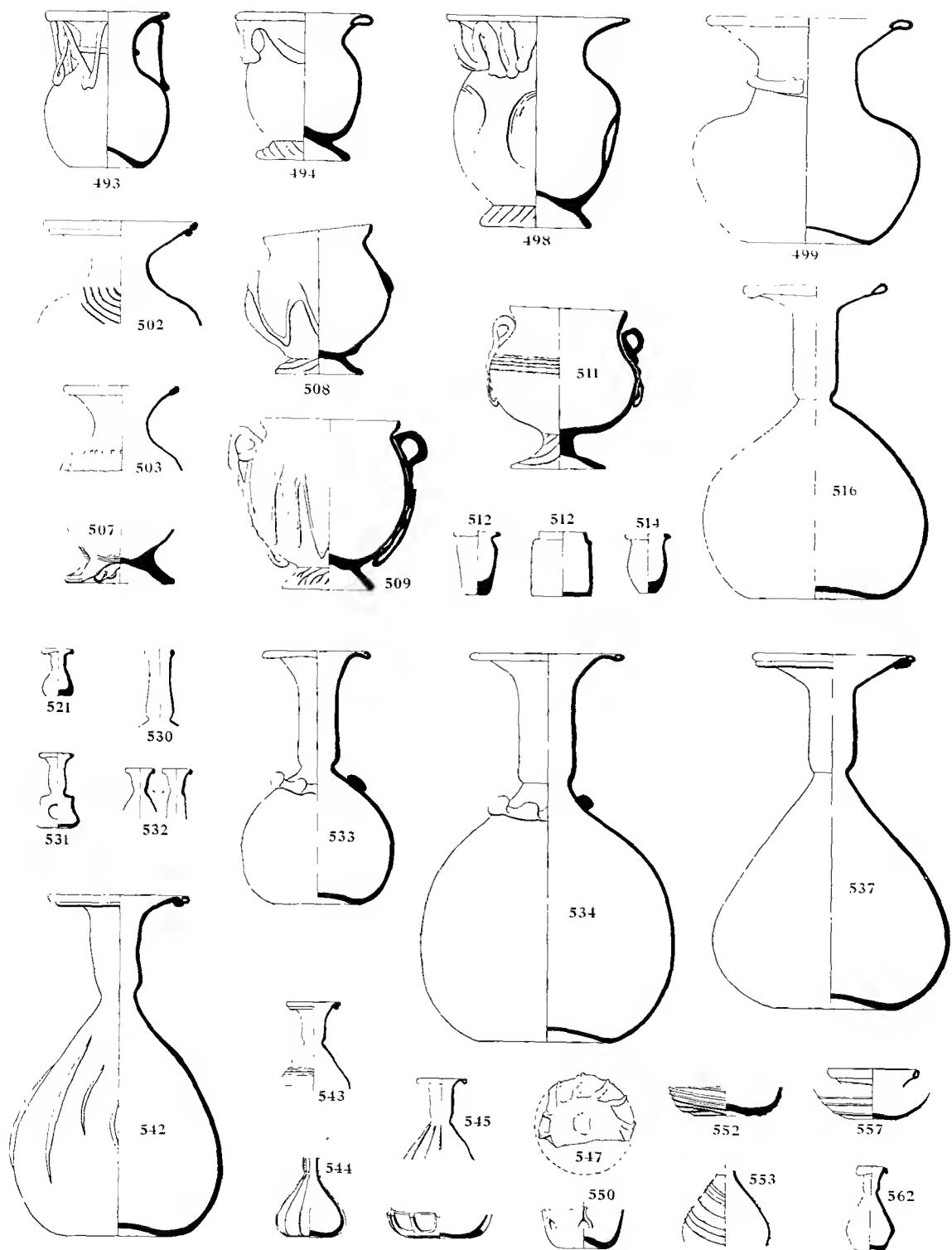




CLASSES V-VII. GOBLETS, CONICAL LAMPS, AND DRINKING CUPS

See pp. 152-73. Scale  $\frac{1}{4}$

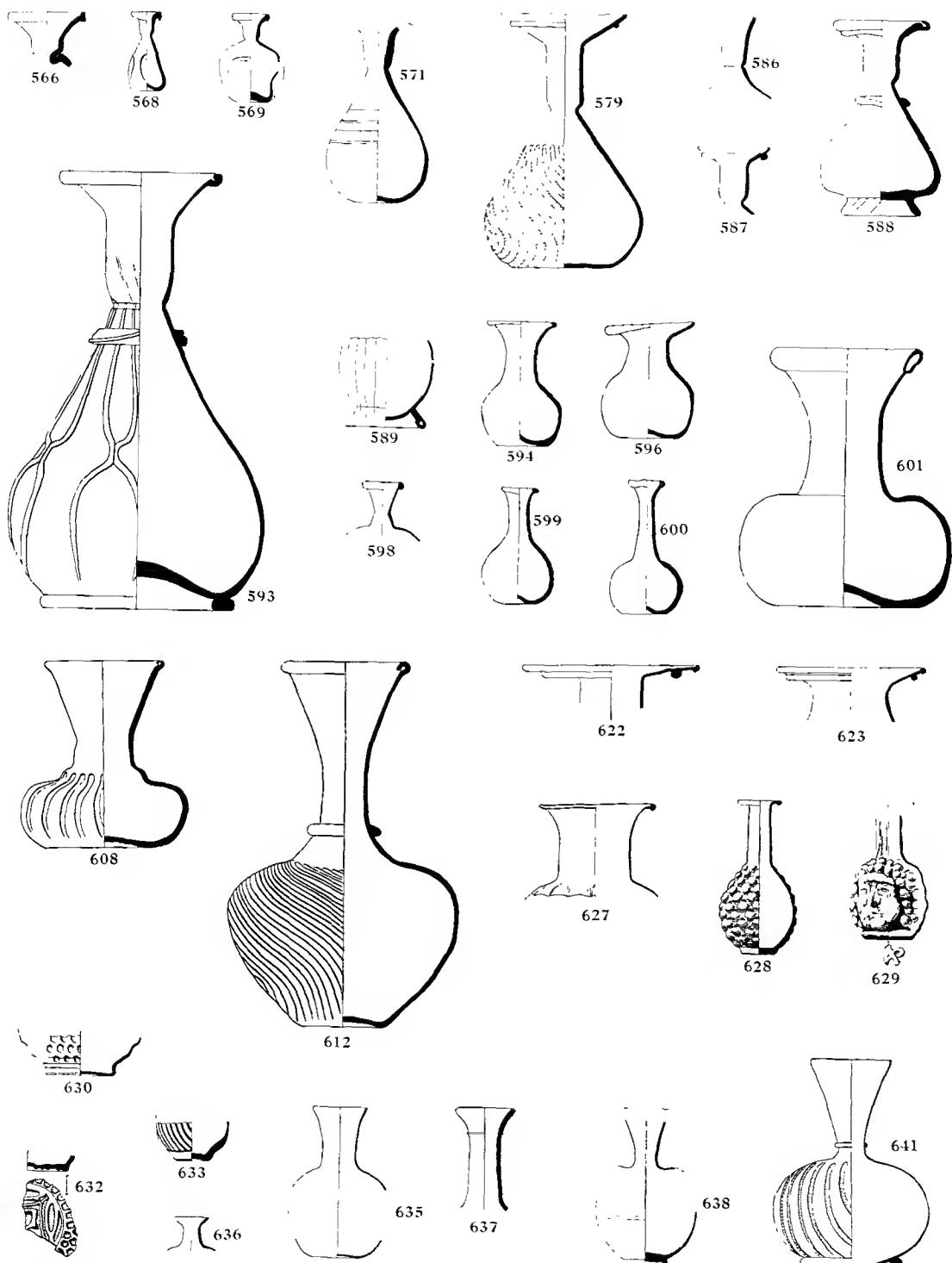




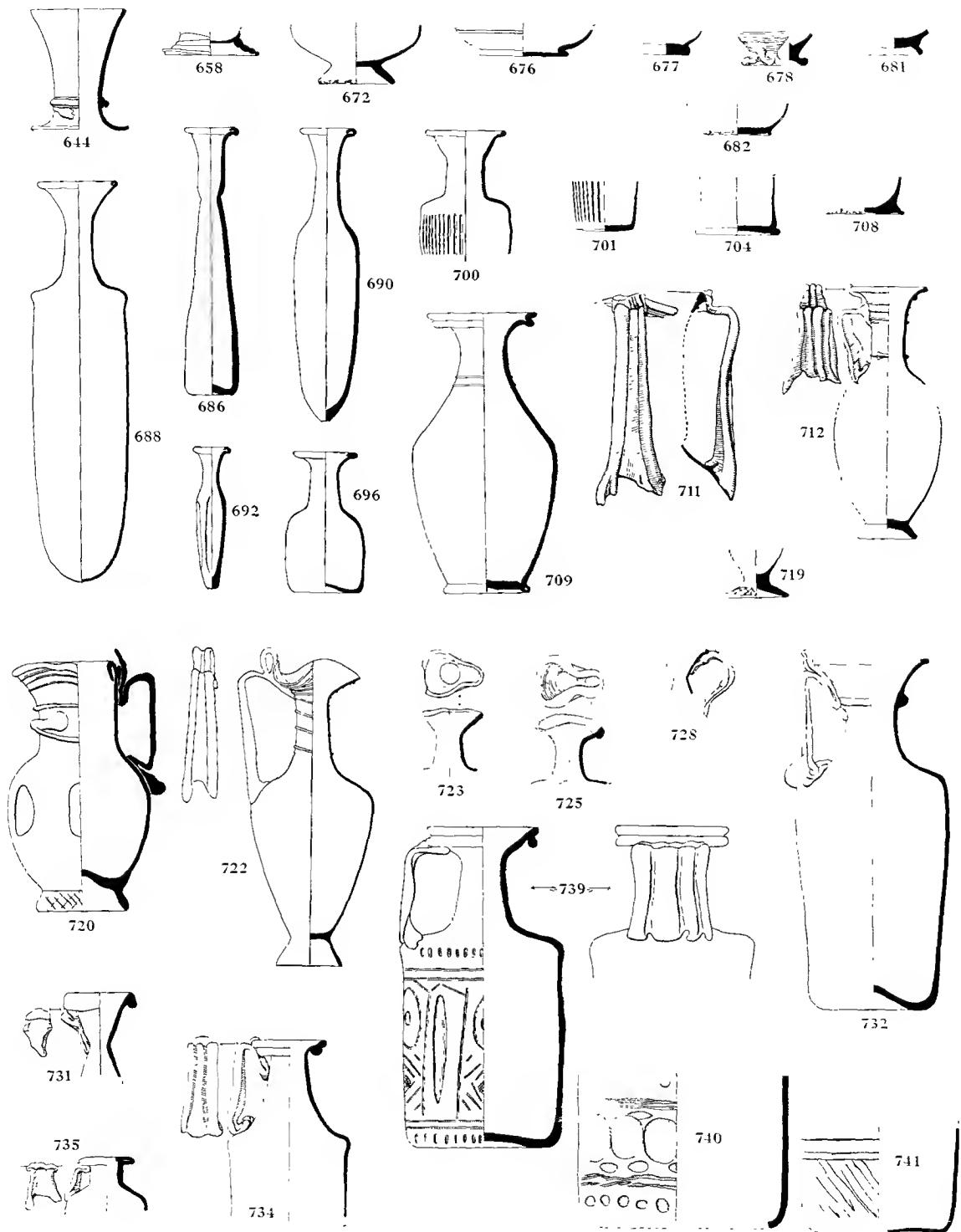
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See pp. 179-203. Scale  $\frac{1}{4}$



CLASS IX. FLASKS (*continued*)See pp. 203-16. Scale  $\frac{1}{4}$

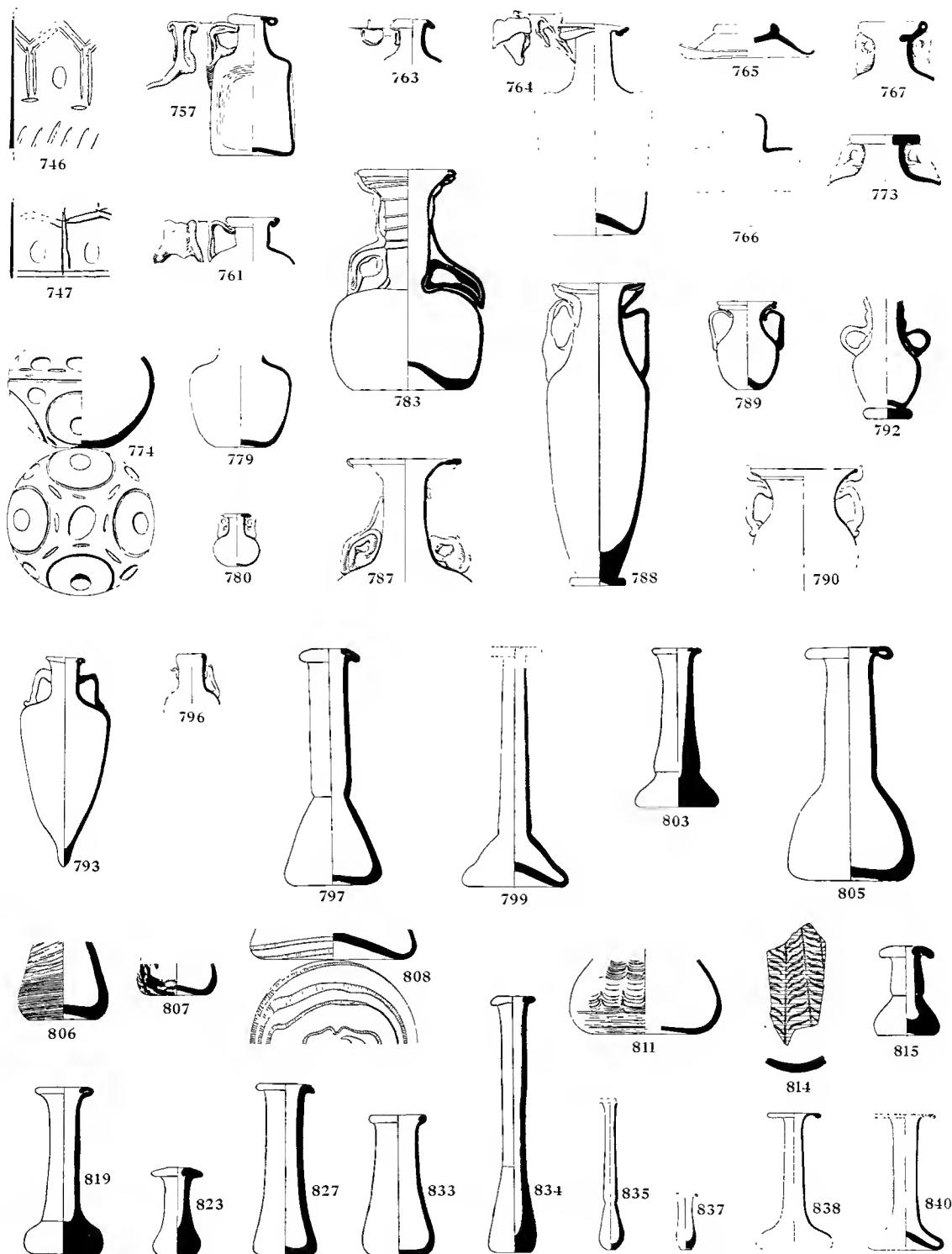




CLASSES IX-XI. FLASKS, BOTTLE-FLASKS, JUGS, AND BOTTLES

See pp. 216-47. Scale  $\frac{1}{4}$





□ Yellow □ White □ Black □ Brown □ Blue □ Red □ Green □ Purple

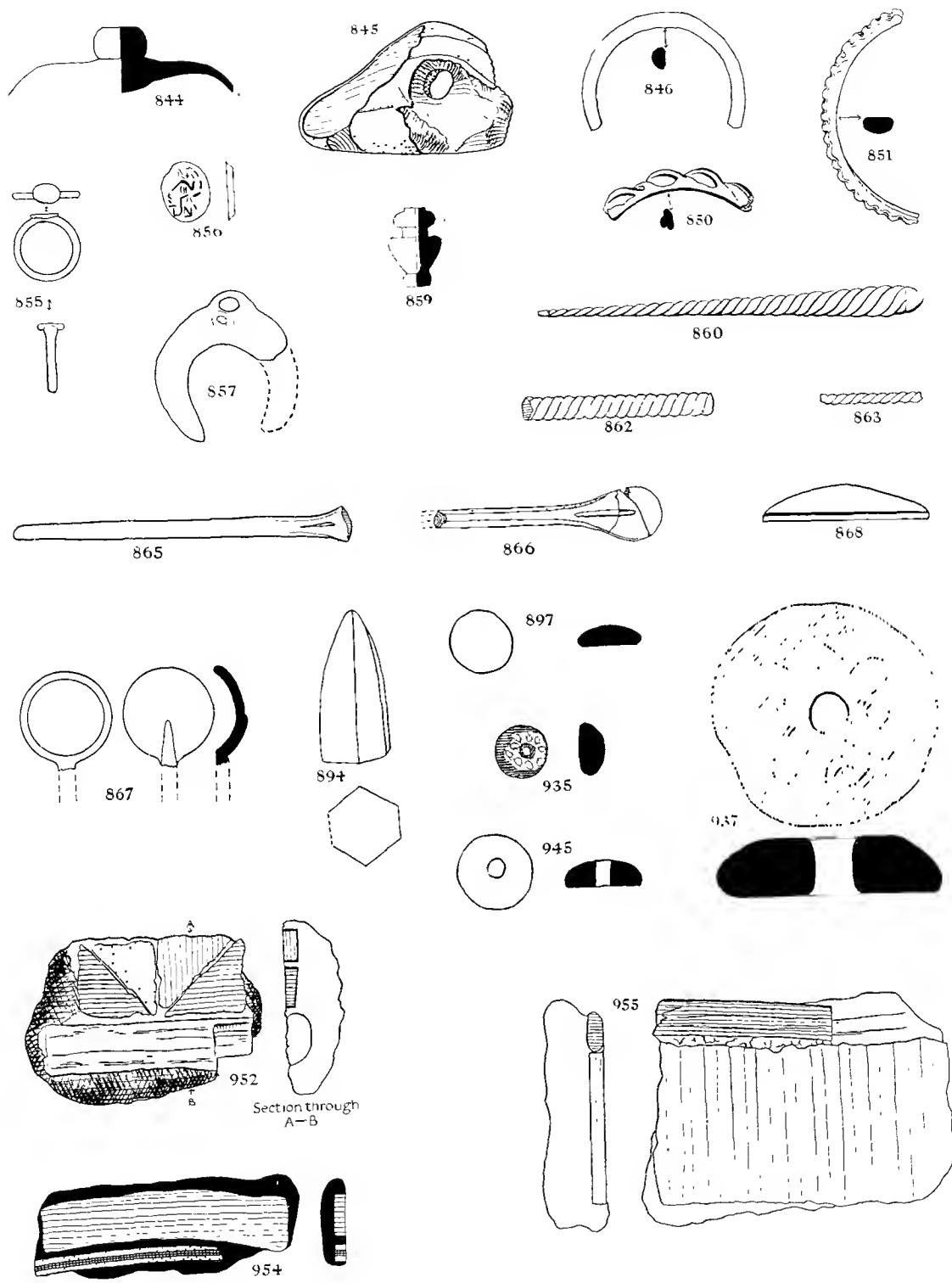
CLASSES XI-XIII. BOTTLES, TWO-HANDED FLASKS, AND TOILET-BOTTLES

See pp. 248-79

No. 814: Scale  $\frac{1}{2}$

Remainder: Scale  $\frac{1}{4}$





Yellow White Black Brown Blue Red Green Purple

## CLASS XIV. GLASS OBJECTS, INLAY, ETC.

See pp. 282-300

Nos. 857, 935, 937, 952, 955: Scale 1

Remainder: Scale 1

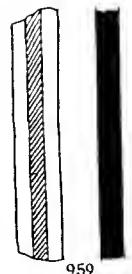




956



958



959



961



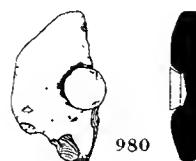
957



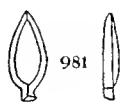
971



979



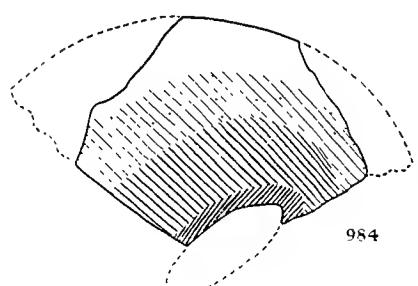
980



981



982



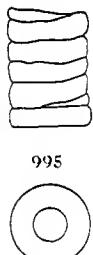
984



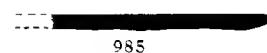
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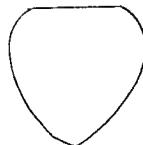
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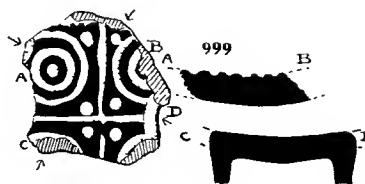
995



985



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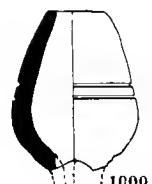


CLASS XIV. GLASS OBJECTS, INLAY, ETC. (continued)

See pp. 300-5

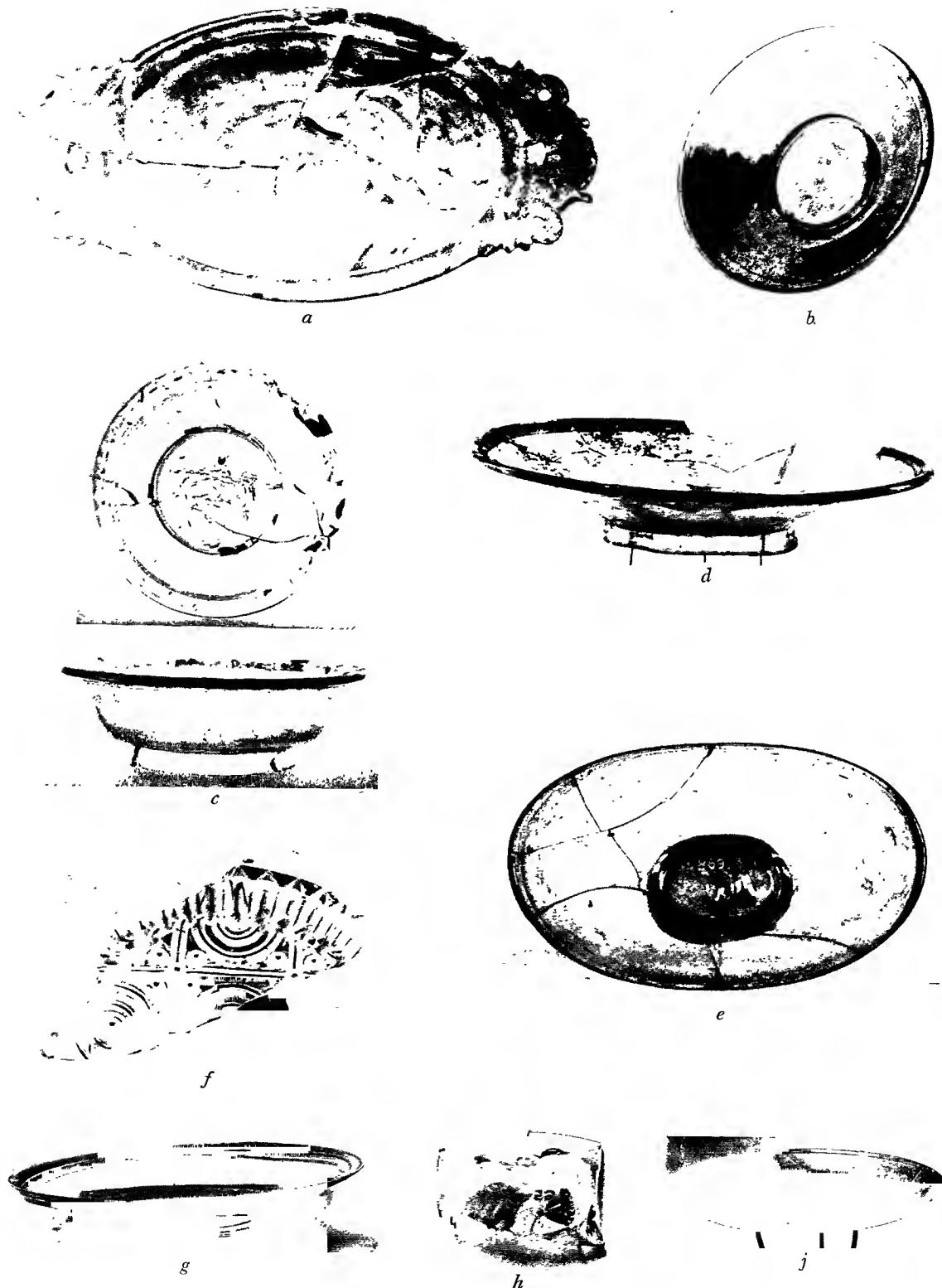
Nos. 956-61: Scale  $\frac{1}{4}$ Nos. 971-1000: Scale  $\frac{1}{2}$ 

	Yellow		White		Black		Brown		Blue		Red		Green		Purple
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1000





a. Cologne, no. 933; see p. 48

b. Cairo, no. J 47078; see pp. 50, 311

c. Cambridge, Dep. 24.29 B; see pp. 66, 119

d. Cologne, no. 26.974; see p. 49

e. Cologne, no. 869; see p. 48

f. Berlin, Antiquarium, Inv. 30638; see p. 93

g. Berlin, Egyptian Museum, Inv. 19347; see pp. 64, 80

h. Victoria and Albert Museum, no. 365.1900; see p. 68

j. Berlin, Egyptian Museum, Inv. 19348; see pp. 64, 82-3

a, d, e, f, h—Sc.  $\frac{1}{2}$ ; c—Sc.  $\frac{1}{4}$ ; g—Sc.  $\frac{3}{4}$ ; b, j—Sc.  $\frac{1}{8}$





a. Cambridge, Ransom Coll., no. 23.788 B; see pp.  
 103, 124  
 b. Victoria and Albert Museum, no. 690.1905; see  
 p. 100  
 c. Cologne, no. 208; see pp. 98, 118  
 d. Cairo, no. J 43344; see pp. 100, 312

e. British Museum, Sloane Coll., 1756; see p. 98  
 f. Cologne, no. 475; see p. 102  
 g. Toledo, no. 354.9871; see pp. 97, 111  
 h, j, k. Brooklyn, Wilbour Coll., nos. 379, 383, 378;  
 see p. 128

a, b, c, f—Sc.  $\frac{1}{2}$ : e, h, j, k—Sc.  $\frac{1}{3}$ : g—Sc.  $\frac{1}{4}$ : d—Sc.  $\frac{1}{6}$

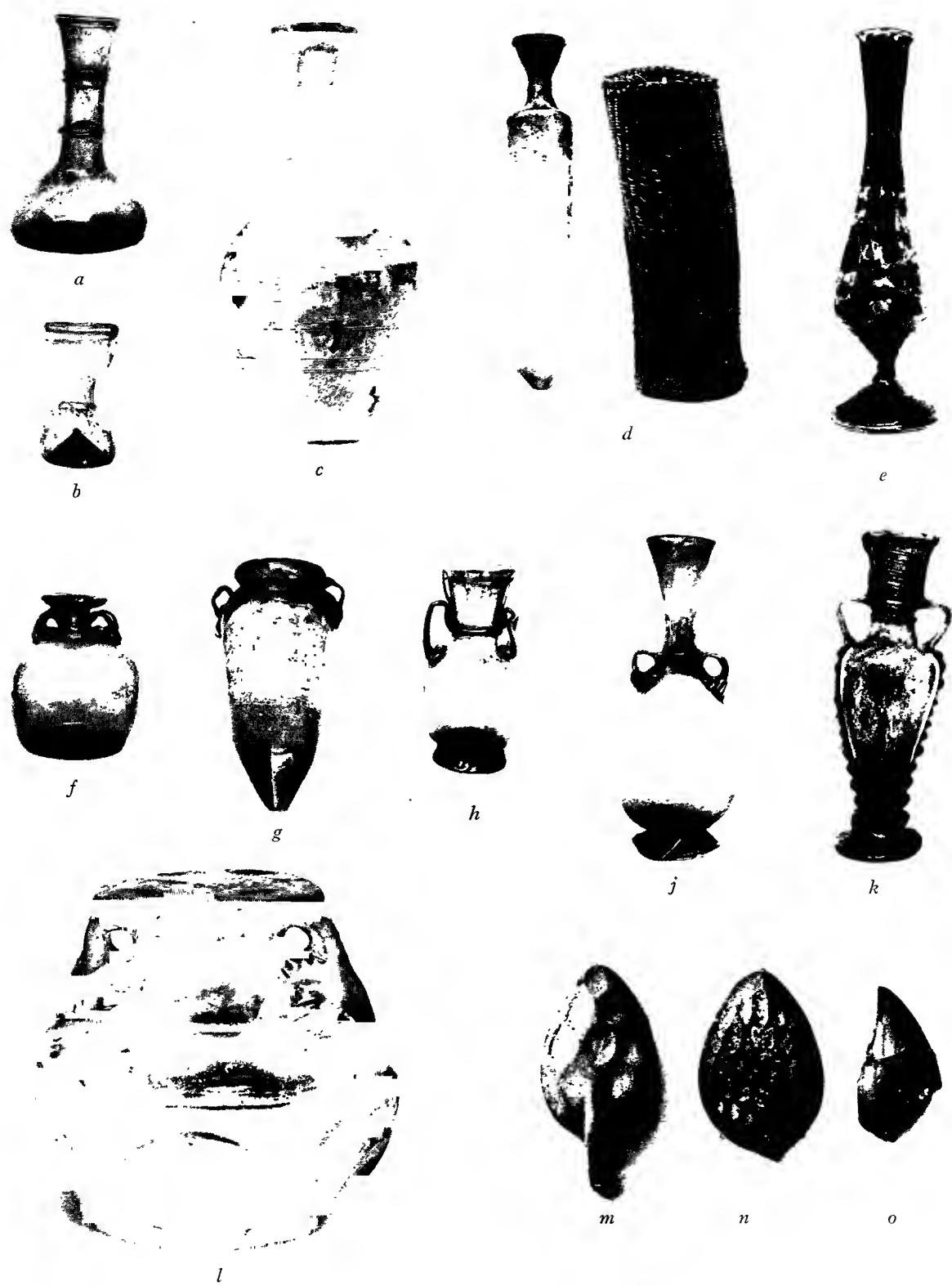




a. British Museum, Turner bequest, 1896; see p. 139  
 b. Berlin, Antiquarium, Vom Rath Coll., no. 182; see p. 139  
 c. Cologne, no. 23.123; see p. 139  
 d. Victoria and Albert Museum, no. C 98.1929; see p. 134  
 e. British Museum, Durighello Coll., 1913; see p. 176  
 f. Toronto, no. G 1980; see p. 177  
 g. Michigan, no. 5120; see pp. 158, 164, 321  
 h. Berlin, Egyptian Museum, Inv. 19360; see pp. 189-90  
 i. Manchester, no. 2082; see pp. 138, 141  
 j. British Museum, Wallis Coll., 1891; see p. 176  
 l. Cairo, no. J 41061; see pp. 189, 314  
 m. Oxford, no. 1912.69; see pp. 189-90  
 n. Kaiser Friedrich Museum, no. 2393; see p. 169

n—Sc.  $\frac{1}{4}$ : b, c, d, f—Sc.  $\frac{1}{2}$ : a, e, k—Sc.  $\frac{1}{3}$ : g, j, m—Sc.  $\frac{1}{4}$ : h, l—Sc.  $\frac{1}{5}$ : i





a. Cairo, no. J 48218; see pp. 192, 315  
 b. Cairo, no. J 40444; see pp. 192, 315  
 c. British Museum, Cesnola Coll.; see p. 215  
 d. Cairo, no. J 45766; see pp. 222, 315  
 e. Cairo, no. J 45767; see pp. 223, 315  
 f. Cairo, no. J 46481; see pp. 255, 317  
 g. Cairo, no. J 45776; see pp. 256, 318  
 h. Cairo, no. J 46484; see pp. 256, 317  
 i. Cairo, no. J 46482; see pp. 256, 317

m, n, o—Sc.  $\frac{1}{2}$ : l—Sc.  $\frac{3}{5}$ : c—Sc.  $\frac{5}{12}$ : e, g, k—Sc.  $\frac{1}{4}$ : a, b, f, h, j—Sc.  $\frac{1}{3}$ : d—Sc.  $\frac{1}{6}$

j. Cairo, no. J 45768; see pp. 256, 317  
 k. Victoria and Albert Museum, no. C 339.1928; see p. 253  
 l. British Museum, Burgon Coll., no. 325; see p. 287  
 m. British Museum, Burgon Coll., no. 326; see p. 287  
 n. British Museum, British and Mediaeval Department, Roach Smith Coll., 1856; see p. 287



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